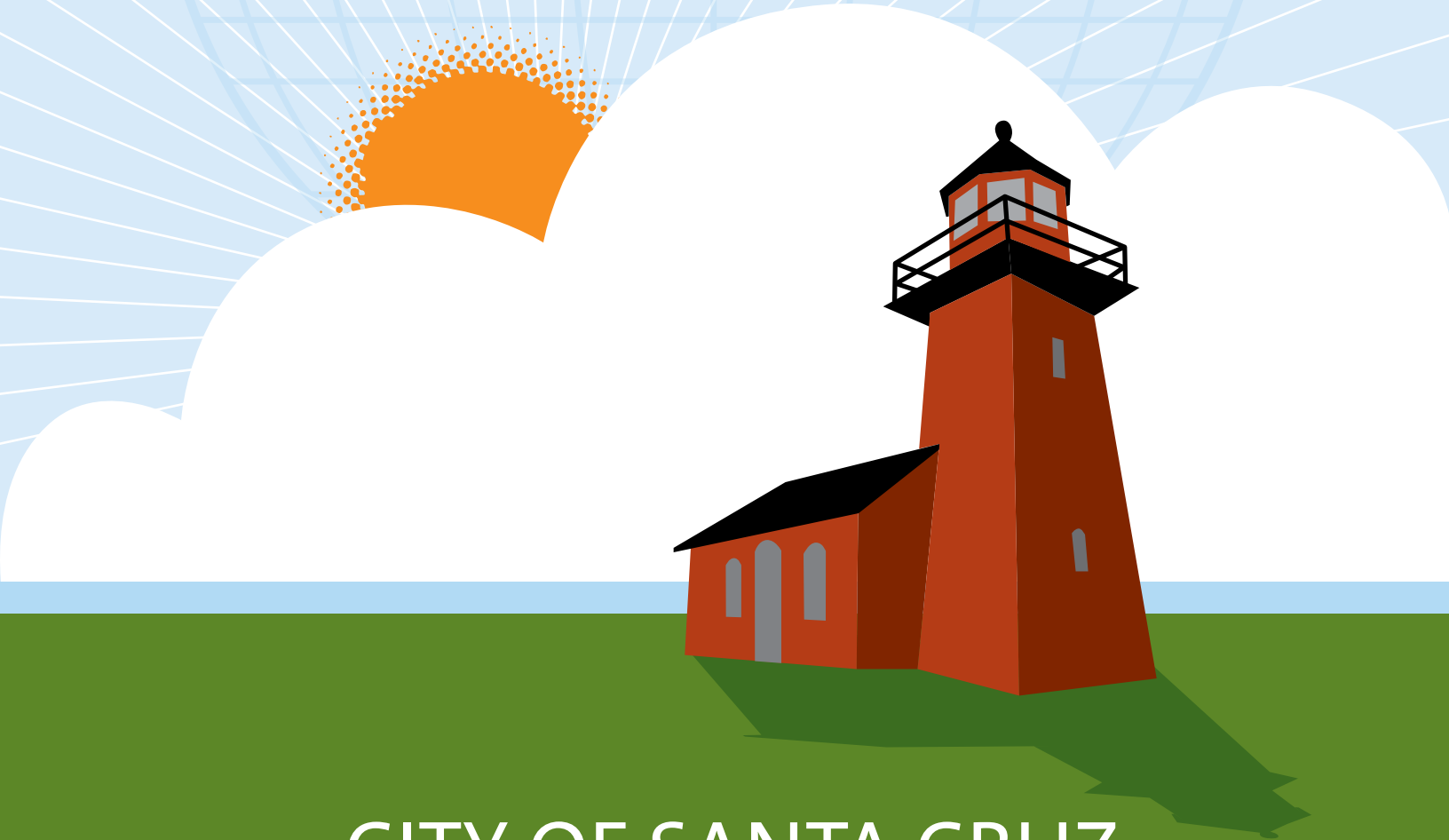
CLIMATE ACTION PLAN



CITY OF SANTA CRUZ

JUNE 2012

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Special thanks to Mayors Reilly, Coonerty, Mathews, and Rotkin

Dedicated to the children of 2050, may we succeed in meeting our responsibilities to your future….

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"Warming of the climate system is unequivocal..."

–International Panel on Climate Change, 4th Assessment Report

ACRONYMS

ADU accessory dwelling unit
AMBAG Association of Monterey Bay Area Governments
ARRA American Recovery and Reinvestment Act of 2009
CAC Climate Action Compact
CAP Climate Action Plan
CARB California Air Resources Board
CAT climate action team
CATP Climate Action Teams Program
CCES Central Coast Energy Services
CenSEPS Center for Sustainable Energy and Power Systems
CEQA California Environmental Quality Act
CERF Coastal Energy Research Facility
CO_2 carbon dioxide
CO_2e carbon dioxide equivalent
CUWCC California Urban Water Conservation Council
EECS Energy Efficiency Conservation Strategy
EIR Environmental Impact Report
EV electric vehicles
GBP Monterey Bay Area Green Business Program
GHG greenhouse gas
GWC Green Wave Campaign
ICLEI Local Governments for Sustainability
IPCC Intergovernmental Panel on Climate Change
IWP Integrated Water Plan
kWh kilowatt hour
LED light emitting diode
LEED Leadership in Environmental and Energy Design
LGOP Local Government Operations Protocol
MOU Memorandum of Understanding
MPO metropolitan planning organization
MTS Master Transportation Study
MWh megawatt hour
NEPA National Environmental Policy Act
PACE Property Assessed Clean Energy
PCW post-consumer waste
PPA Power Purchase Agreements
PPM Parts per million
REC Renewable Energy Committee
ROI Return on Investment
RTC Santa Cruz County Regional Transportation Commission
SCCAT Santa Cruz Climate Action Taskforce
SCCS Santa Cruz City School District
SCS Sustainable Community Strategy
SCWD Santa Cruz Water Department
scwd2 Santa Cruz Water Department and Soquel Creek Water District joint effort to study the feasibility of desalination
SHW solar hot water
Solar PV solar photo voltaic
SOV single occupancy vehicle
SqCWD Soquel Creek Water District
SVJV Silicon Valley Joint Venture
SWRO seawater reverse osmosis
TPWC Transportation and Public Works Commission
TWG Desalination Project Technical Working Group
UCSC University of California, Santa Cruz
VMT vehicle miles traveled

INTRODUCTION

Thousands of leading international climate scientists agree that human activities are the primary contributor to the changing climate. The addition of carbon dioxide, the main greenhouse gas, into the atmosphere through burning oil, natural gas and coal along with the depletion of our dense forests and wetlands, which act as natural carbon dioxide sinks, lead to an unnaturally high concentration of greenhouse gases (GHG) that in turn intensify the natural greenhouse effect on earth.

If humanity continues burning fossil-fuels at the current rate, we will exhaust the reserves over the next few centuries and CO2 will rise to levels of over 1,500 ppm. Unless we make serious efforts now to curb our dependence on fossil fuels, the current and next generation will find themselves in a race between an exhausting fuel resource ("peak oil") and an ever rising concentration of CO2 within the atmosphere. The question is not "can we find another energy option?" but "how can we make a successful transition to a future in which energy will be more scarce and expensive?"

For over two decades, Santa Cruz has taken steps that have the effect of reducing and responding to climate change. In June 2007, the City Council conditionally accepted a set of draft General Plan goals and policies on climate change; including reducing community-wide greenhouse gas emissions thirty percent by 2020, reducing them eighty percent by 2050 (compared to 1990 levels), and for all new buildings to be emissions neutral by 2030.

This Climate Action Plan outlines the actions the City and its partners may take to meet State land use requirements pertaining to climate change, achieve the policies identified in the General Plan 2030, and accomplish the GHG reduction goals set by City Council. It is comprised of nine chapters. The first two chapters describe global climate change issues and Santa Cruz's contribution of greenhouse gases, calculated within the 2008 GHG Inventory. The 2008 Inventory also quantifies the Baseline Emissions Inventory and sets the goals for 2020 and 2050. Chapter Three outlines how the Climate Action Plan was developed and describes the numerous local partners that are helping to implement the actions. Chapters Four through Eight describe measures and actions for various emissions sectors (building energy use, transportation, waste and water) as well as programs to expand renewable energy use and sustainable living practices throughout the community. Chapter Nine describes how the Climate Action Plan will be implemented.

The Climate Action Plan is not a dictate intended to limit future development or economic growth within Santa Cruz. The Climate Action Plan is a strategy for Santa Cruz to grow in a sustainable way that meets GHG reduction goals while continuing to allow for the public and private development and redevelopment that will keep Santa Cruz a vibrant and livable community.

Sustainability in Santa Cruz– environmental stewardship in synchrony with community prosperity.

1 CLIMATE CHANGE & THE CITY OF SANTA CRUZ

For the past several years the City of Santa Cruz has been proactive in studying climate change and developing relevant programs to address it. The science, policy directives, and potential options to address climate change are constantly evolving. This Climate Action Plan provides a tool to guide the community's direction in responsibly addressing climate change and greenhouse gas reductions.

The Intergovernmental Panel on Climate Change (IPCC) has stated in its 2007 Synthesis Report that:

> Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level.

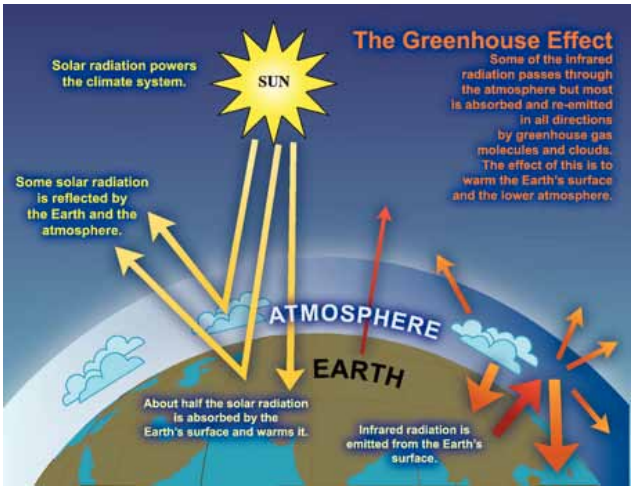

The Greenhouse Effect
Some of the infrared radiation passes through the atmosphere but most is absorbed and re-emitted in all directions by greenhouse gas molecules and clouds. The effect of this is to warm the Earth's surface and the lower atmosphere.
Solar radiation powers the climate system.
SUN
Some solar radiation is reflected by the Earth and the atmosphere.
ATMOSPHERE
EARTH
About half the solar radiation is absorbed by the Earth's surface and warms it.
Infrared radiation is emitted from the Earth's surface.

Figure 1.1 The Greenhouse Effect
Source: Intergovernmental Panel on Climate Change, 4th Assessment Report, 2007

Eleven of the twelve years between 1995-2006 were the warmest in recorded history. Since 1957, there have been fewer cold days and nights and an increase in hot days and nights. The temperature increase is widespread over the globe and is greater at higher northern latitudes. Average Arctic temperatures have increased at almost twice the global average rate in the past 100 years. Since 1961, observations show that the average temperature of the global ocean has increased to depths of at least 3000m. The IPCC has linked this seemingly small increase in global temperature to a wide array of changes to our natural world including a widespread decrease in the amount of snow cover and thickness and range of glaciers across the globe. Since 1978, the Arctic ice cap

has decreased in size by about 3% per year with an average summer decrease of 7.4%. A 10% decrease in global snow cover and earlier spring thaws of rivers and lakes in the northern hemisphere have also been observed. Over the past 50 years, heat waves and serious rain events have been more common and in the past 30 years, there has been an increase in the number of northern Atlantic tropical storms. Global average sea level rose at an average of about 3.1 mm per year from 1993 to 2003[1].

Thousands of leading international climate scientists agree that human activities are partially to blame for the changing climate. The addition of carbon dioxide, the main greenhouse gas, into the atmosphere through burning oil, natural gas and coal along with the depletion of our dense forests, which act as natural carbon dioxide sinks, lead to an unnaturally high concentration of greenhouse gases that in turn intensify the natural greenhouse effect on earth. The greenhouse effect is essential to life. Without it, our planet would have an average temperature of about 14°F, as opposed to a comfortable 60°F.

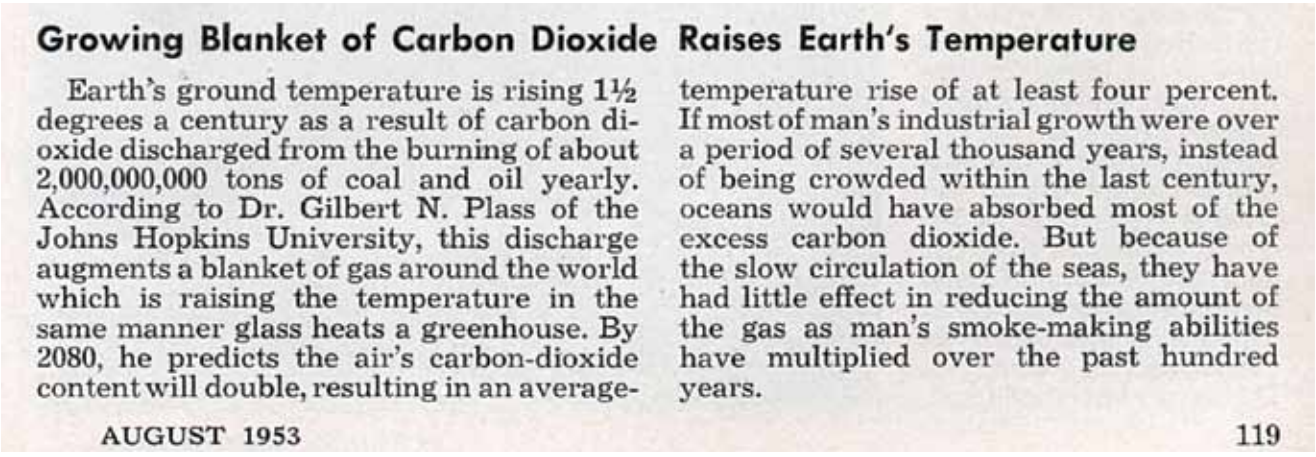
Like the glass in a greenhouse or a car on a hot day, the Earth's atmosphere forms an insulating blanket that traps some of the sun's light rays as heat. Adding greenhouse gases into the atmosphere or destroying natural sinks of these gases increases this effect and causes the globe to trap more heat than it would naturally.

Human interference with the greenhouse effect should not be news to citizens of the new millennium. In 1953 Dr. Gilbert N. Plass of Johns Hopkins University published reports that warned of the pending rise in temperature if humans continued to burn fossil fuels. Dr. Plass predicted an atmospheric doubling of the concentration of carbon dioxide (CO_2) by 2080, from 312 parts per million (ppm) to roughly 620 ppm, and we are on track, if not ahead of his predictions (June 2011 concentrations were 393.69ppm up from 389.9ppm in Feb. 2010).

CO_2 Concentrations in the Atmosphere

Beginning in the late 1950s, Dr. Charles Keeling began collecting "pristine" atmospheric samples–starting in Big Sur, California and later moving his study sites to Mauna Loa, Hawaii and Antarctica–to measure the concentration of CO_2 (carbon dioxide) in the atmosphere. His studies showed the expected annual rise and fall of CO_2 concentrations from the seasonal respiration and photosynthesis cycles of plants, but many were shocked to notice, after several years, that the concentration of CO_2 was rising at about 1 ppm globally per year. Ever since Keeling's work began in the late fifties, CO_2 concentration in the atmosphere has been tracked all over the world with the same results.

If humanity continues burning fossil-fuels at the current rate of acceleration, we will exhaust the reserves over the next few centuries and CO_2 will rise to levels of over 1,500 ppm. Unless we make serious efforts now to curb our dependence on fossil fuels the current and next generation will find themselves in a race between an exhausting fuel resource (peak oil) and an ever rising concentration of CO_2 within the



Growing Blanket of Carbon Dioxide Raises Earth's Temperature

Earth's ground temperature is rising 1½ degrees a century as a result of carbon dioxide discharged from the burning of about 2,000,000,000 tons of coal and oil yearly. According to Dr. Gilbert N. Plass of the Johns Hopkins University, this discharge augments a blanket of gas around the world which is raising the temperature in the same manner glass heats a greenhouse. By 2080, he predicts the air's carbon-dioxide content will double, resulting in an average-temperature rise of at least four percent. If most of man's industrial growth were over a period of several thousand years, instead of being crowded within the last century, oceans would have absorbed most of the excess carbon dioxide. But because of the slow circulation of the seas, they have had little effect in reducing the amount of the gas as man's smoke-making abilities have multiplied over the past hundred years.

AUGUST 1953 119

Figure 1.2 Popular Mechanics 1953

1 Intergovernmental Panel on Climate Change. Climate Change 2007: Synthesis Report

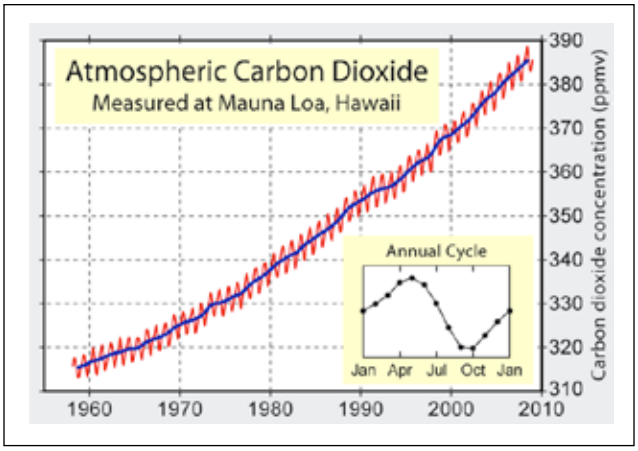

Atmospheric Carbon Dioxide
Measured at Mauna Loa, Hawaii
Annual Cycle
Jan Apr Jul Oct Jan
1960 1970 1980 1990 2000 2010
310 320 330 340 350 360 370 380 390
Carbon dioxide concentration (ppmv)

Figure 1.3 Atmospheric CO_2 Concentrations

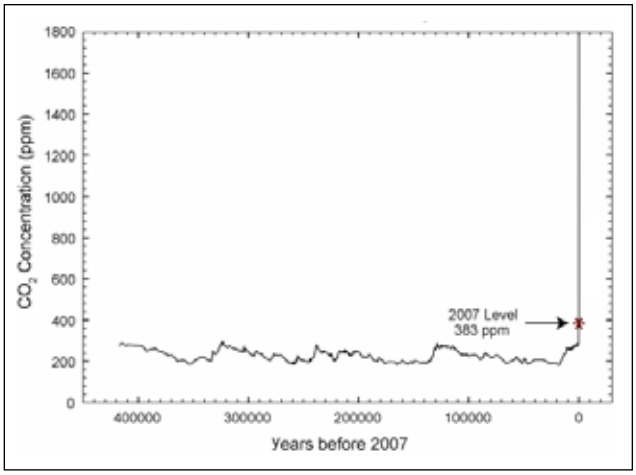


Figure 1.4 Based on Temporal CO_2 estimates, Scripps Institution of Oceanography 2010

atmosphere. The question is not "can we find another energy option?" but "how can we make a successful transition to a future in which energy will be more scarce and expensive?"

The Carbon Cycle

It is important to consider the Earth's carbon cycle when evaluating GHG reduction strategies. Briefly, carbon dioxide is removed from the atmosphere and stored as plant biomass through photosynthesis. That plant biomass is either stored within the plants or released through plant respiration, animal consumption and respiration, or through the decay of the plant material. The effects of this cycle of photosynthesis and respiration can be seen at a global level as the annual fluctuations in carbon dioxide presented in Figure 1.5. This annual change in CO_2 is the result of increased uptake of CO_2 from the atmosphere during the northern hemisphere spring and later release through respiration and decay in the northern fall . The burning of fossil fuels disrupts the carbon cycle by adding additional carbon to the atmosphere that was previously isolated underground and not part of the photosynthesis/respiration cycle. This newly available carbon may be captured and respired indefinitely and becomes part of the new carbon cycle norm. Only when carbon is removed from the cycle through burial of organic debris or calcification by marine organisms is it part of a "sink" and removed from the global carbon cycle.

Non-Linear Tipping Points

Many current climate change reports predict a linear increase in temperatures and changes in storm intensity and sea level rise. However, there are some models that suggest there are key thresholds in temperature and atmospheric CO_2 concentrations that, when reached, would lead to exponential increases in the rate of variable climatic changes. For instance, increases in temperatures in arctic permafrost could lead to accelerated melting and significant and rapid releases of methane that would cause non-linear rises

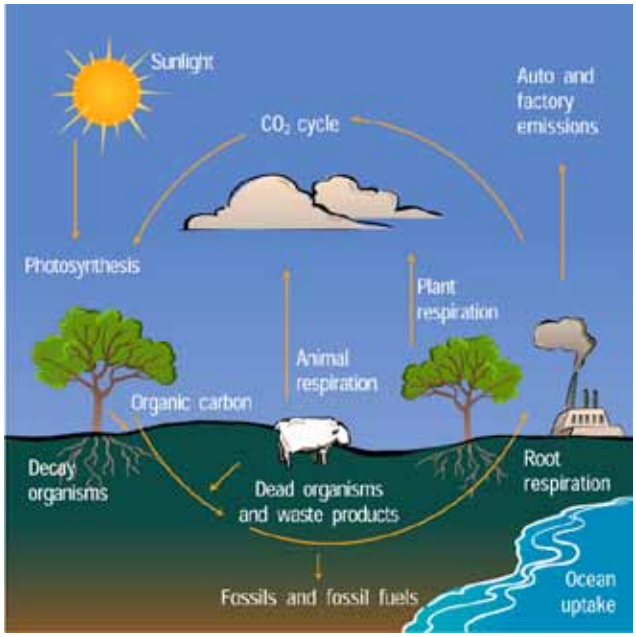


Figure 1.5 The Carbon Cycle (University Corporation for Atmospheric Research (UCAR))

[2] Northern hemisphere hosts a significant portion of the earths land mass and consequently plant biomass.

So-called "global warming" is just a secret ploy by wacko tree-huggers to make America energy independent, clean our air and water, improve the fuel efficiency of our vehicles, kick-start 21st century industries, and make our cities safer and more livable. Don't let them get away with it! –Chip Giller, founder of Grist.org

in atmospheric greenhouse gas concentrations. These uncertainties regarding the possible non-linear responses of climate variables to increased carbon concentrations suggest that current reports may underrepresent the true worst case scenarios as well as the urgency of the crisis. This under-representation may be detrimental for decision-makers, community leaders, and others tasked with minimizing risk through aggressive reductions in emissions and adaptation.

Human Causes of Climate Change

The burning of fossil fuels, deforestation, and the methane gas emissions from landfills and livestock are significant contributors to the observed increases in surface and oceanic temperatures, increased rates of sea level rise, ocean acidification, melting of subalpine glaciers, and many other effects of climate change.

Fossil Fuel Use

Fossil fuels (coal, natural gas, gasoline, oil etc.) formed over millions of years from ancient carbon-based life forms and consequently are a very limited resource. Our society has grown dependent on fossil fuels–which emit large amounts of carbon dioxide and methane into the atmosphere during combustion –since the industrial revolution due to their high energy density, portability and ease of use. Over 75% of the world's yearly greenhouse gas emissions are from the combustion of fossil fuels. China and the United States are the largest contributors to fossil fuel emissions.

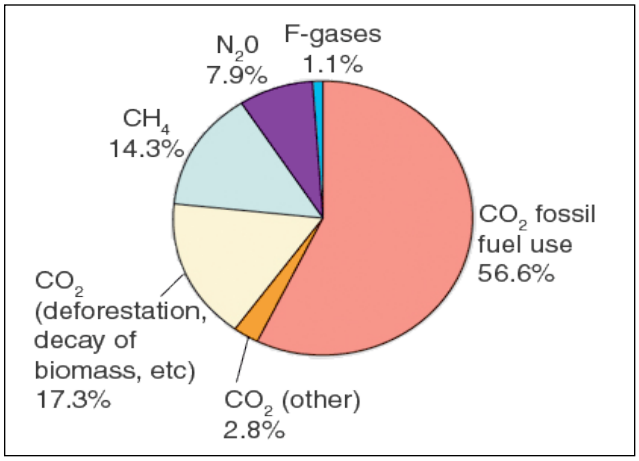


Figure 1.6 Global Anthropogenic Greenhouse Gas Emissions in 2004 (IPCC *4th Assessment Report: Climate Change 2007*)

Loss of Natural Habitat

Land use changes that result in the loss of natural habitat contribute significantly to climate change. Large scale deforestation through human clearing for grazing and plantation farming (as in the Philippines for bio-diesel) and forest fires are currently responsible for 17% of global GHG emissions.

In addition, since 1850, California has lost 80% of its coastal wetlands, 96% of its interior wetlands, and 99% of its valley grasslands[3]. Each of these natural systems captured and stored carbon. Over decades or centuries, these same ecosystems can recapture carbon if they are restored or allowed to reestablish.

Impacts of Urban Environments

The urban heat island effect is often overlooked when addressing climate change. The urban heat island effect is caused by the conversion of vegetated land surfaces to hardened urban surfaces that retain heat. The heat absorbed by the concrete and other urban surfaces is radiated back to the surrounding urban environment raising afternoon high temperatures and reducing evening cooling patterns. In order to counteract this increase in local temperatures, people increase the use of air-conditioners, which requires additional energy and results in more greenhouse gas emissions.

Methane Release from Organic Material

The anaerobic (without oxygen) decomposition of organic material such as plant material and food waste occurs in landfills, wastewater digesters, wetlands and other places devoid of air. Unlike composting, which occurs in the presence of air, anaerobic decomposition releases methane rather than CO_2. Because methane is 21 times more potent of a GHG than CO_2, human induced anaerobic digestion is a significant contribu-

3 California Natural Resources Agency, State of the State Wetlands Report, 2010

tor to climate change (14% of global emissions). Effective capture and use of methane as a fuel source or changes in decomposition mechanisms from anaerobic to aerobic modify the gas emissions from methane to CO2, effectively reducing emissions by 21 times.

Climate Change and Peak Oil

Fossil fuels are non-renewable resources and therefore, are being depleted. At some point in the future, maximum global petroleum extraction will be reached (peak oil) and then there will follow a perpetual decline in fossil fuel production. Predictions vary about when global oil production will peak, but even optimistic reports state that by 2020 production will begin to decline. The US Military's 2010 Joint Operating Environment (JOE) Report states:

By 2012, surplus oil production capacity could entirely disappear, and as early as 2015, the shortfall in output could reach nearly ten million barrels per day.[4]

Although there is controversy over the way that the energy future will play out, predictions of large curtailments of energy supply, with serious consequences, are becoming increasingly main stream. As a way to create a successful and smooth transition to a future where energy resources are scarce and more expensive, the City will work with County and regional leaders to create an Energy Descent Plan for the Monterey Bay Area. Several communities (i.e. San Luis Obispo County) have completed Energy Descent Plans that prescribe actions that can be taken to limit the vulnerability of local economies to the volatility in future energy costs as well as ensure or increase the quality of life for people living in our community. Such a plan would further identify programs and collaborative opportunities that can protect the region from rising energy costs while helping address climate change mitigation and adaptation efforts.

Local Impacts of Climate Change

IPCC scientists predict that the serious consequences of climate change will continue to grow and expand. The rapid and unprecedented increase in surface temperature is accelerating the planet's water cycle, which will make severe storms and droughts more frequent and severe[5]. These events will likely disrupt and damage food and fresh water supplies. The extreme increases in temperature to come will continue to melt the Greenland ice shelf and cause the oceans to thermally expand, both of which will raise the average level of all oceans. This rise in sea-level will have multiple effects, including coastline destruction, the displacement of major population centers, and economic disruption.

Figure 1.7 The dark blue color shows where increased inundation will occur without adaptation from a 1.4m sea level rise. The blue is the current 100 year flood zone as defined by FEMA. (Source: Pacific Institute)

City of Santa Cruz Climate Vulnerability Study

Santa Cruz will be impacted by nearly all of the effects of climate change including changes in the weather, sea-level rise, depletion of fresh water resources, destruction of ecosystems, degradation of human health, disruption of the economy, and erosion of the coastline. These impacts will disrupt the lifestyles of Santa Cruz residents, businesses and visitors. Such impacts are real and need to be addressed. Additional information on climate change-related threats the City will face is reported in the City of Santa Cruz Climate Vulnerability Study (available on the City website). The City has completed a Climate Adaptation Plan that defines municipal response of significant potential impacts to the community from a changing climate. In addition, the City is partnering with the Monterey Bay National Marine Sanctuary, the Center for Ocean Solutions and others to initiate regional climate vulnerability and adaptation planning efforts.

4 US Military's 2010 Joint Operating Environment (JOE) Report

5 Global Climate Change Impacts in the United States, 2009

Climate and Weather

Climate change will impact Santa Cruz's day-to-day weather patterns and will very likely cause more frequent periods of wet days and hot dry days. Santa Cruz will also see more extreme periodic heat waves, more fog in the summer months, and more severe freezes during the winter. Perhaps most importantly, the increase in precipitation will not be over long periods of time but rather in short and extreme bursts that will increase the chances of flash flooding and mudslides.

Sea Level Rise

Since 1900, the average global sea level has risen by about three inches. In the next 100 years, sea level is expected to rise by as much as four and one half feet[6]. This does not mean that Santa Cruz will experience the minimum or maximum predicted rise as exact levels depend on local topography, average temperature of the local ocean, and circulation patterns. The rise in sea level could cause increasingly severe coastline destruction and lead to the displacement of homes and businesses in the downtown and other low-lying areas. A rise in groundwater below the city will also cause flooding of underground infrastructure such as basements, electrical conduits and water pipes.

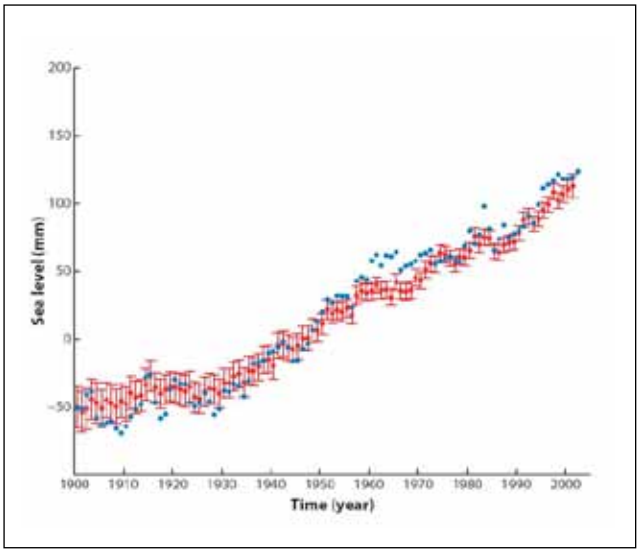


Figure 1.8 Annual Tide Gauge Records

Fresh Water Resources

In Santa Cruz, we rely entirely on local sources for our community's water supply. The changes in rainfall patterns, as predicted by the IPCC, could result in increased flooding events followed by extended periods of drought. For over a century, the City Water Department has maintained a reliable water system providing water to much of Santa Cruz County. This system, however, relies on somewhat reliable weather patterns that, with a changing climate, may become problematic. Currently, the City is researching the utility of a seawater desalination plant, specifically as a backup resource during drought periods, predicted to be more frequent due to climate change.

Plants and Animals

The effects of climate change have also been evident in the plant and animal worlds. Over the past 25 years, 80% of the changes in distribution and behavior of organisms have been consistent with the changes in local surface temperature. Animal and plant species across Earth have been shifting their ranges to areas more north as well as higher elevation, both which correspond to cooler temperatures[7]. All of the phenomena that have occurred from a 1.5 degree rise in temperature have had a myriad of impacts that are already changing natural environments and ecosystems planet wide. The predicted temperature increase of 2 - 12 degrees over the next century will have potentially devastating effects. Currently, global species extinction is on the rise and researchers are continuing to identify local extinction (or extirpation) of some species attributed to climate change[8].

Central Coast Ecosystems

Santa Cruz citizens cherish their open space and natural environment. Kelp forests, redwood groves, and oak woodlands are synonymous with Santa Cruz. A changing climate will lead to a change in the summer temperature extremes, ocean surface temperatures, rain fall patterns, and fog patterns, all of which will result in a change in ecosystem structure and species diversity. For instance, a recent study found that annual fog density patterns on the San Francisco peninsula have decreased over the last few decades. If such reductions occur on the Santa Cruz coast, declines in redwood survival from decreases in fog drip, decreases in kelp forests, and increases in evaporation from our watersheds are likely.

6 Climate Change Scenarios and Sea Level Rise Estimates for the California 2009 Climate Change Scenarios Assessment
7 Global Climate Change Impacts in the United States, T. Karl et al. Cambridge University Press, 2009.
8 Extinction risk from climate change, C. Thomas et. al, Nature, January 2004

Ocean Acidification

Ocean acidification describes the decrease in the pH, or the increase in the acidity of the global oceans resulting from the uptake of human generated carbon dioxide from the atmosphere. Less than half of the carbon dioxide produced historically by the burning of oil, gas and coal stays in the atmosphere and about a third currently ends up dissolving into the oceans. While this process has helped remove very large quantities of carbon dioxide from the atmosphere, reducing the greenhouse effects that would have otherwise been significantly greater, it continues to make the oceans more acidic.

By the first decade of the 21st century, the pH or acidity of the world oceans had increased by about 30% over the "natural" pre-industrial revolution level. As carbon dioxide emissions continue with the burning of fossil fuels, additional carbon dioxide will enter the oceans and pH will continue to decrease. Future rates of change will depend upon when and how rapidly the US and the rest of industrialized society choose to move away from a fossil fuel based economy[9].

It is believed that this progressive decline in pH or shift towards increased acidity will gradually begin to affect the organisms in the ocean that build their skeletons or shells out of calcium carbonate. Calcium carbonate dissolves in acidic solutions, so the lower the pH, the more difficult it will be for these organisms to either grow new shells or skeletons or maintain their existing health and populations. Ocean acidification can affect both the larger and more visible organisms such as coral, sea urchins, and mollusks and also many zoo- and phytoplankton that are the primary producers and first level consumers within the ocean food web. These tiny organisms lie at the base of the food chain and provide the food supply for the larger plankton such as krill, which are the primary food source for salmon and other fish, as well as sea birds and baleen whales. Phytoplankton are credited with producing 70% of the worlds oxygen through photosynthesis and impacts to phytoplankton species distribution and abundance due to changes in global ocean pH is still uncertain.

Economy

Santa Cruz's economy relies heavily on tourism as a scenic coastal destination. In addition to its numerous beaches and coastal attractions, the local parks and open spaces bring many visitors to the City. Threats to coastal resources and open space as well as to public infrastructure and resources may diminish many of the current attractions upon which local businesses rely.

Mandates to Act

Executive Order S-3-05

California is a substantial contributor of global greenhouse gases, emitting over 400 million metric tons of carbon dioxide a year[10]. In June 2005, Governor Schwarzenegger established California's greenhouse gas emissions reduction targets in Executive Order S-3-05. The Executive Order established the following goals:

- **Greenhouse gas emissions should be reduced to 2000 levels by 2010*;**
- **Greenhouse gas emissions should be reduced to 1990 levels by 2020*; and**
- **Greenhouse gas emissions should be reduced to 80% below 1990 levels by 2050.**

**the City of Santa Cruz has already achieved these two State objectives.*

Global Warming Solutions Act of 2006 (Assembly Bill 32)

The State's Legislature enacted Assembly Bill 32, the California Global Warming Solutions Act of 2006, which Governor Schwarzenegger signed on September 27, 2006 to further the goals of Executive Order S-3-05. Assembly Bill 32 states:

Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems.[11]

9 Excerpt from Gary Griggs & Brent Haddad, 2011, City of Santa Cruz Climate Adaptation Study.

10 Air Resources Board 1990 to 2004 State Inventory (November 2007)

11 Global Warming Solutions Act, Assembly Bill 32, 2006.

AB 32 represents the first enforceable statewide program to limit greenhouse gas emissions from all major industries with penalties for noncompliance. The foremost objective of California Air Resources Board (CARB), tasked with implementing AB 32, is to adopt regulations that require the reporting and verification of statewide greenhouse gas emissions. The initial State goal is to limit greenhouse gas emissions to 1990 levels by 2020. In January 2008, a statewide cap for 2020 emissions based on 1990 levels was adopted. In June 2010, CARB prescribed GHG reduction goals to regional governments, including the Association of Monterey Bay Area Governments (AMBAG). These prescriptions are the regional benchmarks from which to track local reductions.

Table 1.1 **City Council Leadership and Direction**

–Created Solar Municipal Utility Codes (1982)
–Joined ICLEI's Cities for Climate Protection Campaign (1998)
–Adopted Zero Waste as Long-term City Goal (2000)
–Endorsed the Kyoto Protocol and Million Solar Roofs Initiative (2005)
–Adopted U.S. Mayors Climate Protection Agreement (2005)
–Adopted Climate Action Declaration (October 2006)
–Adopts Green Building Program (2005)
–Approved Draft General Plan Goal (February 2007)
–Join the Regional Climate Action Compact (November 2007)
–Established a Climate Action Program (November 2007)
–Community–Wide Emissions Inventories for 1996, 2000, 2005, 2008
–Completed first draft of a Climate Action Plan (September 2010)
–Completed Draft Climate Adaptation Plan (September 2011)
–Completed Final Draft Climate Action Plan (October 2011)

Santa Cruz Precedent to Act

The City of Santa Cruz did not need a State mandate. For over two decades, Santa Cruz has taken steps that have the effect of reducing and responding to climate change (Table 1.1).

In June 2007, the City Council conditionally accepted a set of draft General Plan goals and policies on climate change; including reducing community-wide greenhouse gas emissions thirty percent by 2020, reducing them eighty percent by 2050 (compared to 1990 levels), and for all new buildings to be emissions neutral by 2030.

City of Santa Cruz Climate Action Program

In 2007, the City of Santa Cruz established the Climate Action Program and hired a Climate Action Coordinator to focus the City's climate change ef-

Table 1.2 **Climate Action Plan and the General Plan**

Listed below are the Draft General Plan Goals and Policies that pertain directly to climate change. In addition, many other goals and policies have already been accepted that seek "smart growth," transportation efficiency, and similar outcomes.

Goal NRC4	**Effective leadership and action in reducing and responding to global warming.**
NRC 4.1	Reduce community-wide greenhouse gas emissions 30 percent by 2020 and 80 percent by 2050 (compared to 1990 levels).
NRC 4.2	By 2030, require all new development be carbon neutral.
NRC 4.3	Support initiatives, legislation, and actions for reducing and responding to climate change.
NRC 4.4	Encourage community involvement and public-private partnerships to reduce and respond to global warming.
NRC 4.5	Minimize impacts of future sea level rise.
NRC 4.6	Take early action on significant and probable global warming land use and development issues, including those that might arise after 2025.
Goal NRC7	**Reduction in energy use, and significant production and use of renewable energy.**
NRC 7.1	Improve local energy efficiency and conservation.
NRC 7.2	Increase the local use and production of renewable energy.
NRC 7.3	Increase local energy awareness.
NRC 7.4	Promote energy efficiency and innovation as an integral part of economic development.
NRC 7.5	Promote energy-efficient local transportation.
NRC 7.6	Promote energy-efficiency in the provision and use of water.

1.2 Table City Climate Action goals as stated in the General Plan.

forts, help coordinate the City's current climate change-related actions and programs, and provide a point of contact for public interest and regional partnerships. The Coordinator is responsible for conducting the GHG Emissions Inventories and facilitating the completion of this Climate Action Plan (CAP), which is designed to engage and guide each sector of our community in taking action to reach our climate change goals. The CAP will implement policies of the 2030 General Plan Update. Other responsibilities for the Coordinator include:

- Researching municipal best practices in reducing greenhouse gas emissions and responding to climate change impacts
- Coordinating volunteer and consultant resources
- Coordinating City participation in regional climate change initiatives
- Supporting internal City staff efforts to reduce and respond to climate change
- Drafting and evaluating proposed General Plan Action Programs
- Communicating the City's climate change efforts and initiatives

In California, every municipality is required under State law to have a General Plan that includes multiple elements dealing with land use, housing, transportation, environmental assets and other areas. The General Plan is the blueprint for a city's future physical development, environmental preservation, and delivery of services. The State Attorney General has initiated lawsuits and settlements with a number of local jurisdictions for inadequate consideration of climate change in their General Plans. Through the completion of this Climate Action Plan, Santa Cruz will meet and exceeded compliance with the State climate change requirements as outlined in AB 32 and the California Environmental Quality Act (CEQA).

City of Santa Cruz Climate Action Plan Framework

This Climate Action Plan outlines the actions the City and its partners may take to meet State land use requirements pertaining to climate change, achieve the policies identified in the draft General Plan 2030 update, and to accomplish the reduction goals set by City Council. It is comprised of eight chapters. The first two chapters describe the global climate change issues and Santa Cruz's contribution of Greenhouse Gases, calculated within the 2008 GHG Inventory. The 2008 inventory also quantifies the baseline emissions inventory and goals for 2020 and 2050. Chapter Three outlines how the Climate Action Plan was developed and describes the numerous local partners that are helping to implement the actions. Chapters Four through Eight describe measures and actions for various emissions sectors (building energy use, transportation, waste and water) as well as programs to expand renewable energy use and sustainable living practices throughout the community. Chapter Nine details our CAP implementation strategy. Appendix A provides a table of actions necessary to meet each reduction measure and prioritizes their implementation based on funding, ease, and current infrastructure.

"The era of procrastination, of half measures, of soothing and baffling expedients of delay are coming to a close. In its place, we are entering a period of consequences."

—Winston Churchill

2 GREENHOUSE GAS EMISSIONS

Background & Methodology

The first step in establishing a Climate Action Plan is to quantify the past and current greenhouse gas emissions from the municipality and from the various community sources (transportation, residential homes, business and industry) within the City. This information identifies key emissions sectors, helps focus reduction strategies, and sets initial levels from which to track program success. The City of Santa Cruz has used resources and technical expertise from several key organizations to accurately quantify our past and present GHG emissions.

Technical Support and Resources

Local Governments for Sustainability (ICLEI) is an international organization that assists local governments in reaching their goals of sustainability and climate change mitigation. The Climate Action Program staff has worked closely with ICLEI as one of the 500 members (including 130 California members) representing the United States in the Cities for Climate Protection campaign, an internationally recognized program that provides the framework and tools necessary for communities to track and reduce their GHG emissions.

The tools offered to local governments by ICLEI include useful software that organize energy use data and help calculate emissions savings available from hundreds of different projects, upgrades and programs (icleiusa.org).

The Local Government Operations Protocol (LGOP) was produced through the partnerships of many organizations including ICLEI USA, the California Air Resources Board, the California Climate Action Registry, as well as many local municipalities, and serves as a guideline for proper data collection and analysis. The LGOP contains methodologies for calculating the emissions of the six main greenhouse gases: carbon dioxide, sulfur hexafluoride, nitrous oxide, methane, hydrofluorocarbons, and perfluorocarbons. Unless noted, all of the emissions reports in this Climate Action Plan were produced using the LGOP.

AMBAG 2005 Municipal and Community GHG Emissions Reports The Association of Monterey Bay Area Governments (AMBAG) received funding to generate 2005 GHG emissions inventories for all municipalities within their service area. The inventories were completed and submitted to each municipality in early 2011. The data within the inventory they generated for the City correlates well with the 2005 Santa Cruz staff completed inventory and as such, assisted the City by establishing a process for quantifying transportation emissions which had not previously been established. There are some discrepancies

between the City and AMBAG inventories. Specifically, the AMBAG inventory includes emissions from energy use by the University of California, Santa Cruz which are not part of the City emissions study. The AMBAG inventory also includes Waste Scope 1 and Waste Scope 3 emissions from the landfill which are addressed in detail later in this chapter. The City has updated our four GHG inventories using the standard transportation emissions calculation method developed by AMBAG. Our 1996, 2000, 2005 & 2008 emissions reports are now finalized and the AMBAG third party analysis supports our results.

Emissions Sectors

Throughout this document, municipal, community, and City will be referred to when discussing both emissions and actions. The municipal sector will include all municipal operations that allow for the day-to-day operation of City services. Community or community-wide refers to all activity within the City limits including all municipal, residential, commercial, waste, industrial, and transportation emissions. Community-wide may also be interchanged with City-wide. The transportation sector quantifies all vehicle traffic (except miles traveled on the UCSC campus) within the City limits on both local roads and highways. Note, UCSC has developed a GHG inventory for the Campus and is actively pursuing reduction programs.

Data Sources

Raw data used to calculate municipal emissions come from within the City's various departments. Energy use, fuel use, and various other metrics are tracked on specific computer programs or from hardcopy sources. All waste data used to calculate the associated community emissions (tons disposed, coverage of landfill gas capture system, etc.) are provided internally by the City Resource Recovery Facility staff. Residential, commercial, and industrial emissions from electricity and natural gas use are calculated from energy use data provided by PG&E. In the fall of 2010, AMBAG initiated a program to complete GHG emissions inventories for all member municipalities. As a component of that process, AMBAG selected and implemented a protocol to calculate transportation emissions for highway miles that was different than previously completed by the City. To be consistent with regional municipalities, the Climate Action Program staff has adopted the model defined by AMBAG.

Carbon Dioxide Equivalent

Most emissions will be reported as metric tons of carbon dioxide equivalent (tons CO_2e) in order to simplify how emissions are categorized, since there are many types of greenhouse gases emitted through the consumption of fossil fuels and the anaerobic digestion of waste. For example, when electricity is generated, CO_2 (carbon dioxide), CH_4 (methane), NOx (nitrous oxides) and other greenhouse gases are emitted all with their own unique heat-trapping abilities called Global Warming Potential (GWP). Carbon dioxide has a GWP of exactly one (since it is the baseline unit to which all other greenhouse gases are compared). Methane's GWP is 21 since it traps 21 times more heat than CO_2; therefore, every ton of methane emitted is equivalent to 21 tons of CO_2e. Nitrous oxides have a GWP of roughly 310. If one ton of methane and one ton of nitrous oxides are emitted, this is the same as saying 331 tons CO_2e are emitted ([1 ton CH_4 x 21]+[1 ton NOx x 310] = 331 tons CO_2e).

Community Greenhouse Gas Emissions Baseline

A baseline greenhouse gas emissions inventory sets the initial levels of emissions from which all reduction goals will be based. The Climate Action Program staff completed a baseline inventory from activities in 1996. Although the international standard for a baseline inventory is 1990, the City of Santa Cruz did not have enough historical data for that year. California State agencies have recommended using a one percent annual growth rate in emissions to back calculate 1990 emissions levels. The City has used this calculation (Table 2.1) to set reduction goals of 30% below 1990 levels by 2020, and 80% below by 2050[12].

Figure 2.1 depicts 1996 emissions for all sectors excluding Scope 1 waste emissions which cannot be reduced further (see next paragraph), from all activities within Santa Cruz City limits. It is organized into sectors and reported in metric tons of carbon dioxide equivalent (CO_2e). The industrial/ commercial and residential sectors include emissions from the generation of electricity used at the site and the onsite combustion of natural gas for cooking and space and water heating. The local traffic sector includes all vehicle use within the City limits on local roads, highway

12 1996 emissions are used as the Santa Cruz baseline because earlier data are unavailable, State and county emissions data suggest that emissions between 1990 and 1996 rose approximately 1% annually.

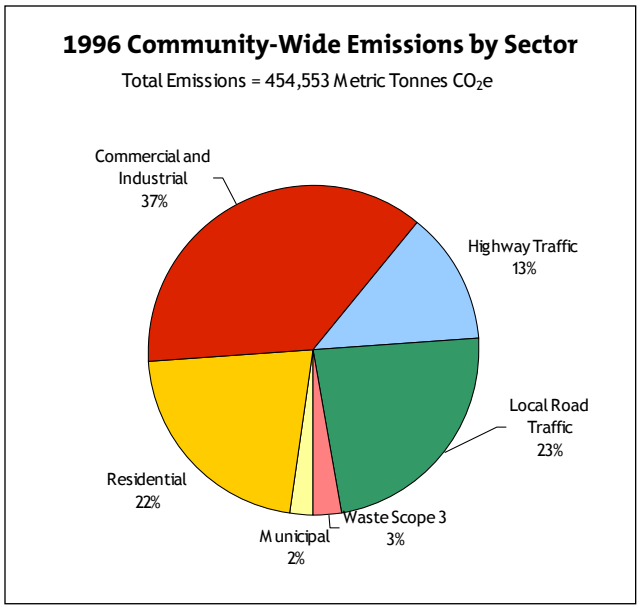


Figure 2.1 1996 Community Emissions

traffic accounts for vehicle emissions on State highways within City limits. Municipal operations, including all public services such as street lighting, City vehicle use, heating and lighting of public facilities, water treatment and delivery, and the treatment of most of the county's wastewater in 1996, account for only 2% of the total community emissions.

The only sector of emissions that was inventoried but not reported here is Scope 1 waste emissions. These are the greenhouse gases that escape the landfill facility every year though the anaerobic digestion of organic waste buried in the landfill. Currently, the State guidance for calculating Scope 1 emissions numbers makes the assumption that 25% of this "fugitive" methane cannot be captured. Climate Action Program staff believes that this assumption leads to erroneous results. The City's landfill has a gas capture system that catches most of the fugitive methane and burns it in an onsite generator to create millions of kWh of electricity. As the City has improved the methane capture system, resulting in greater volumes of methane captured, the amount of fugitive emissions calculated using a static assumption of 25% loss (Scope 1) also increases. Therefore, while Scope 1 landfill gas reporting is necessary for State protocol, these data do not provide information that can lead to additional reduction strategies and are therefore not a primary concern and not included in the baseline emissions inventory.

Waste Scope 3 emissions are the future emissions associated with the waste disposed by our community in the given year. In other words, Waste Scope 3 emissions will someday become Waste Scope 1 emissions once the waste decomposes and is released as methane. Since Scope 3 emissions quantify current waste generation practices, these data are of greater concern for the Climate Action Plan and are an important benchmark from which to quantify waste reduction actions.

Using State guidelines[13] to extrapolate 1990 GHG emissions, we have estimated (Table 2.1) that the Santa Cruz community emitted 427,280 tons of CO_2e in 1990. This emissions value will be used as our baseline from which to measure success in meeting city and state reduction goals and ensure that the city meets State guidelines for calculating emissions reductions. This estimate is more accurate than what most municipalities can calculate because the City was able to complete a 1996 emissions inventory (using printed PG&E records) from which to base 1990 estimates rather than using 2005 values. The Climate Action Program has adopted a 2020 reduction objective of 299,096 tons CO_2e for the community and 6,683 tons for the municipality. 2030 reduction goals

Table 2.1 **Baseline Emissions & Future Reduction Goals by Sector**

Community Sector	1990 est.	2008	2020 Objectives	2030 Objectives
Municipal	9,548	10,261	6,683	5,614
Residential	92,783	76,805	64,948	54,556
Commercial/Industrial	157,628	93,304	110,339	92,685
Transportation	154,973	160,762	108,481	91,124
Waste (Scope 3)	12,349	10,189	8,644	7,261
Total	427,280	351,321	299,096	251,241

1990 numbers were estimated using a State recommended growth factor of one percent annually.

[13] California Air Board 2011 guidelines.

are also defined to correctly support the 2030 General Plan implementation and will require future updates to the CAP Chart of Implementation Actions (Appendix A) to ensure that the City invests in success and addresses unmet goals.

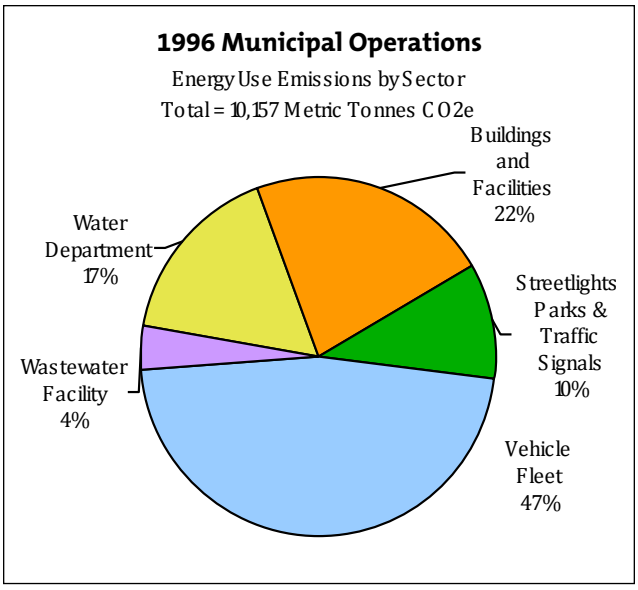
It is important to note that there was a significant decline in emissions from industry between 1996 and 2000 due to a loss in manufacturing. The decline was the result of a loss of large industry including Wrigley's, Lipton and Salz Tannery and was not entirely the result of efficiency measures taken by that sector. Since loss of industry is not a prudent climate reduction strategy and industry as a sector has already met their 2020 reduction goals, the City will continue to work with business and industry to increase efficiency of local businesses to help us meet our community wide objectives and support our business communities continued efforts to be more sustainable and competitive. If Santa Cruz is successful in encouraging new energy intensive manufacturing or other industry to locate within the City, increases in emissions for this sector will occur. Every effort will be made to ensure that new and current businesses are as energy efficient as possible, along with other measures the community takes to make Santa Cruz a sustainable community. As stated throughout the CAP, the Santa Cruz GHG reduction strategy is to reduce overall carbon emissions while fostering a robust economy. Current and expanded programs in this plan will encourage businesses that locate within Santa Cruz to be more energy efficient than businesses located elsewhere.

Table 2.1 defines the baseline emissions for 1990 and sets reduction goals for 2020 (30%) and 2030 (41%) for all sectors of the Santa Cruz community. As noted in the table, 1996 emissions for the commercial/industrial sector included emissions for industry that no longer exists. Thus, the 2020 reduction goals for commercial are greater than current values. Additional commercial reductions will support the community wide reduction efforts and enable the community to select the most cost effective measures first.

The 1990 community emissions baseline value for Santa Cruz, from which all reduction goals are based, is 427,280 tons CO_2e annually.

Sub-Sectors of Municipal Emissions

A close inspection of municipal emissions by sector is necessary as State regulations will soon go into effect that will require strict reporting of these emissions. Climate Action Program staff has reported municipal emissions by sectors just as the community-wide emissions. Figure 2.2 depicts 1996 and 2008 emissions associated with the operation of all City services by sector. The majority of emissions in 1996, 4,266 tons, came from the vehicle fleet, which includes refuse collection trucks, police and fire vehicles, and vehicles used for City business. The second largest source of municipal emissions was the lighting and heating


1996 Municipal Operations
Energy Use Emissions by Sector
Total = 10,157 Metric Tonnes CO2e
Buildings and Facilities 22%
Water Department 17%
Streetlights Parks & Traffic Signals 10%
Wastewater Facility 4%
Vehicle Fleet 47%

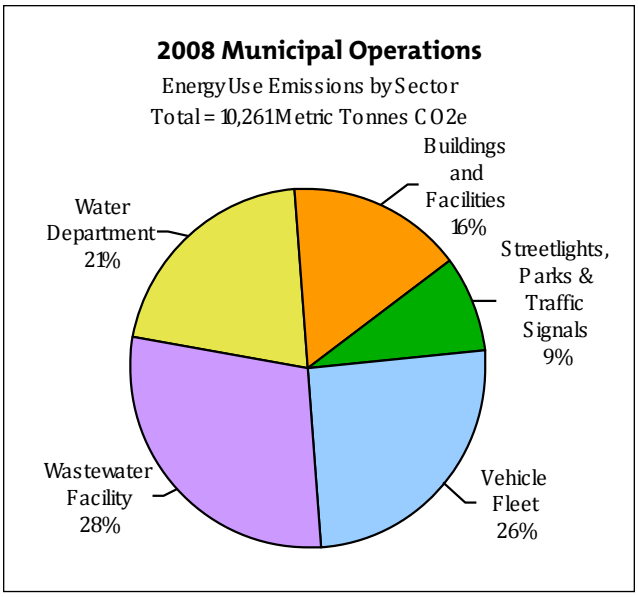

2008 Municipal Operations
Energy Use Emissions by Sector
Total = 10,261 Metric Tonnes CO2e
Buildings and Facilities 16%
Water Department 21%
Streetlights, Parks & Traffic Signals 9%
Wastewater Facility 28%
Vehicle Fleet 26%

Figure 2.2 Municipal emissions by sector 1996 and 2008

of all public buildings including City Hall, libraries, fire stations, and community centers. The pumping, treatment, and distribution of water and wastewater made up approximately 20% of municipal emissions. In 2008 overall municipal emissions were similar but emissions by sector were different. The City has made great progress at reducing emissions from the vehicle fleet and has achieved reductions from lighting and buildings. Water and wastewater have increased the level of service and treatment which has led to increases in emissions for those sectors.

In 1996, the City emitted 10,157 tons of CO_2e and therefore has a 2020 annual emissions target of 6,683 tons CO_2e.

Emissions goals for municipal operations could be set evenly (i.e. 30% reductions) among departments and operations. Reductions from some operations, however, will be easier and less expensive than others. Therefore a process to determine the most cost effective actions has been established (see Municipal Energy Management Office and Energy Efficiency Conservation Strategy in Ch 4). Chapter 4 also outlines some of the programs and procedures that will help to prioritize actions throughout all municipal operations necessary to reduce overall emissions to below 6,683 tons.

We have done our best to provide the community with an accurate picture of our energy use and GHG emissions using the ever-changing tools and resources available. City staff made use of emissions reporting methods as they improved over the course of conducting the inventories.

Tracking Community Greenhouse Gas Emissions

Climate Action Program staff has not only inventoried emissions from the baseline year of 1996, but also from calendar years 2000, 2005, and 2008. These three other inventories have been performed in order to track emissions over long periods and provide a measure of how we have been performing in our efforts to become a more sustainable community. Table 2.2 summarizes the emissions from all community sectors for all years mentioned. The table also includes how much each sector has changed since 1996. As discussed in the City of Santa Cruz 2008 Greenhouse Gas Emissions Inventory, there are inherent errors, assumptions, and confounding factors associated with completing a GHG inventory, and due to the methods used to calculate these values, some values are less precise than others. Regardless, at a macro level, these values help to direct attention and action necessary to move towards the 2020 objectives. In the end, individual sector emissions can vary from the established goals as long as Santa Cruz as a whole meets our community-wide GHG reduction goal (299,096 tons).

Since 1996, the residential and commercial/industry sectors have made significant reductions in their emissions and should be applauded. Residents reduced home energy use by 22%. Local businesses and industries have reduced emissions 3% since 2000, most likely as a result of investments in energy efficient equipment as well as participation in local energy efficiency programs that provide subsidized ret-

Table 2.2 **Santa Cruz Community-Wide GHG Emissions (Tons CO_2e)**

	1990 est.	1996	2000	2005	2008	% change from 1996	2020 Emissions Objective
Municipal	9,548	10,157	10,231	10,239	10,261	1%	6,683
Residential	92,783	98,705	87,605	67,812	76,805	-22%	64,948
Commercial Industrial	157,628	167,689	95,769	79,900	93,304	-44%	110,339
Transportation	154,973	164,865	175,555	169,715	160,762	-2%	108,481
Waste (Scope 3)	12,349	13,137	15,751	11,088	10,189	-22%	8,644
Total	351,321	454,553	384,912	338,754	351,321	-23%	299,096

1990 estimates are caluculated using state guidance of assuming 1% annual emissions growth between 1990 and 2000. ***Note:** Commercial GHG reductions between 1996 and 2000 were primarily due to the loss of manufacturing industry in Santa Cruz.

rofitting of commercial lighting and replacement of inefficient appliances. The 22% reduction in Waste Scope 3 emissions is the direct result of a significant reduction in waste put into the landfill, an excellent example of a community-wide reduction effort with programs and leadership by the City. The transportation sector has achieved reductions in emissions since 1996 of 2%. Currently, transportation emissions remain highly dependent on fuel price and the economy. While the municipal emissions do not appear to have changed at all, the reality is that the City has invested in many energy efficiency, renewable energy, and resource conservation measures that have significantly reduced GHGs. At the same time, the mandated upgrade in the Wastewater Treatment Facility[14] and the 31% increase in GHG per unit of energy provided by PG&E[15] have led to a net 1% gain in our overall footprint.

Figure 2.3 tracks community emissions by sector for the four inventory years. Notice that the large drop in commercial/industrial emissions from 1996 to 2000 is included in calculating goals and reductions. The drop in transportation emissions from 2005 to 2008 is noticeable here and is most likely due to recent economic conditions that have caused residents to drive less to save money. The bright red section of this graph (dark grey at top of last column) represents the reductions that must be achieved in order for the community to reach our 30% reduction below 1996 levels by 2020 goal.

Figure 2.4 depicts temporally representative trends in emissions for all inventory years in relation to our 2020 goals. As the figure suggests, community wide emissions reductions are on track. The purpose of this Climate Action Plan is to provide a guide to

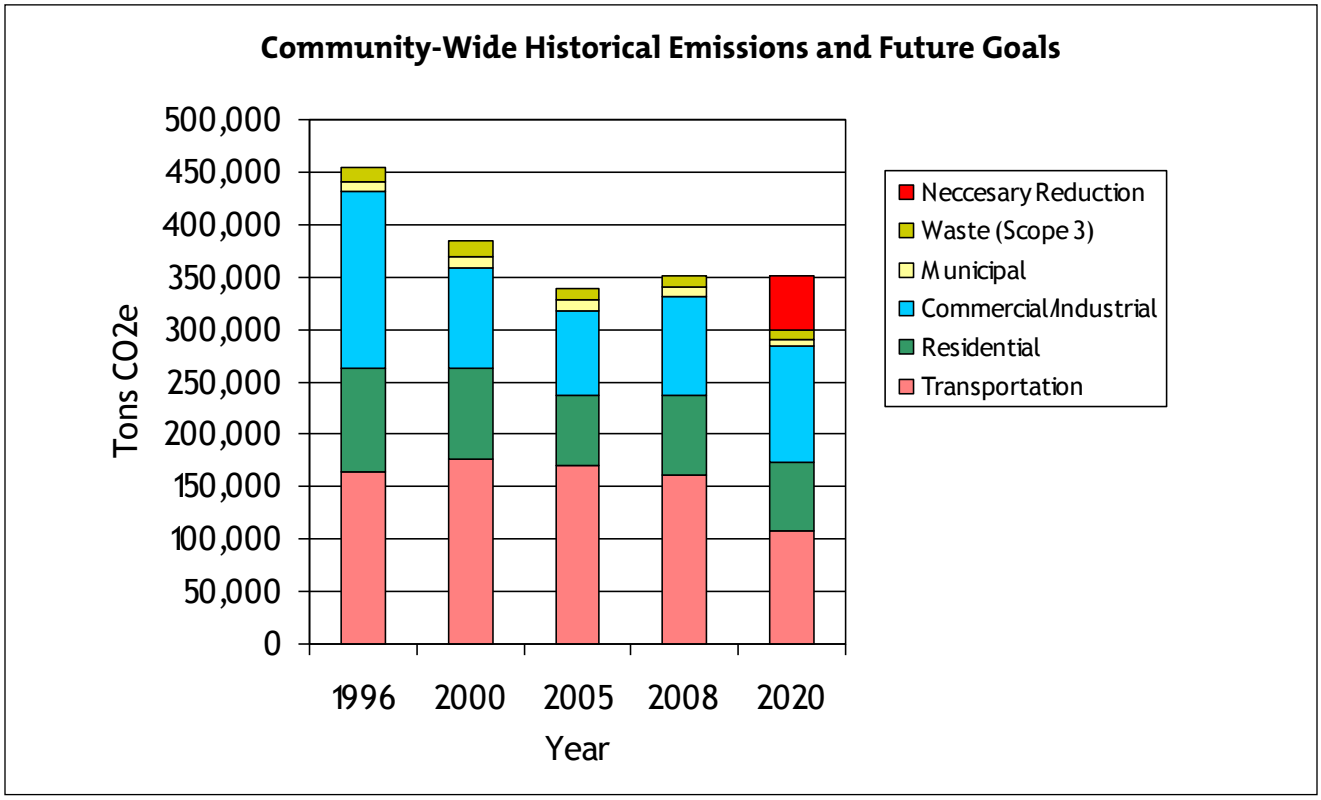


Figure 2.3 Community-Wide GHG Emissions and 2020 Reduction Goal

14 In 1999, the City upgraded the Wastewater Treatment Facility from primary to advanced secondary (a much higher level of treatment to protect coastal water quality) which increased energy use threefold for that facility.

15 While municipal energy use fell between 2005 and 2008, the carbon content of every kWh of electricity produced by PG&E increased by 31% (due in part to several years of drought leading to lower hydro-electric power generation), causing CO_2e emissions from electricity use to increase in 2008 for the municipal, commercial and residential sectors.

achieve the reductions through various programs, incentives, partnerships, and innovations all geared towards reducing greenhouse gas emissions. The Santa Cruz community has already demonstrated their intent to conserve resources and reduce GHG emissions through a variety of actions. None of these individual actions has undermined lifestyles or livelihoods, but in most cases has improved both. Together, Santa Cruz is more than capable of meeting our GHG emissions goals (2020 and 2050). Accomplishing these goals while at the same time supporting our quality of life and improving our local economy is our GHG reduction strategy.

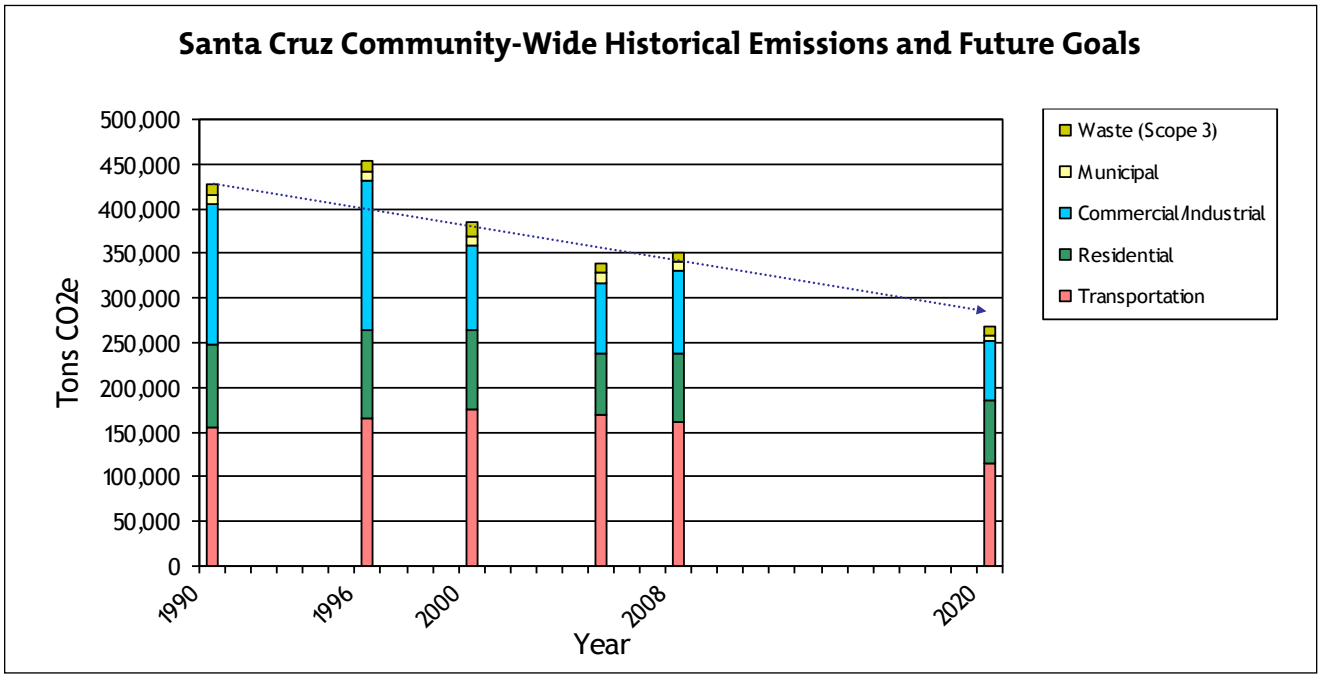


Figure 2.4 Annual emissions - trajectory towards 2020 goals

3 GREENHOUSE GAS REDUCTIONS

General Plan 2030

The City of Santa Cruz has initiated a comprehensive revision of Santa Cruz's 1990-2005 General Plan. The new General Plan 2030 will outline the vision and policies for how Santa Cruz should grow over the next twenty years to remain a compact, vibrant city that preserves the diversity and quality of its natural and built environments. At the same time, it seeks to improve the quality of life for its diverse population and workers, and attract visitors from around the world.

In 2006 the City Council adopted a set of goals and policies that outline how the City should respond to climate change, both by reducing its impact through an aggressive reduction in community-wide GHG emissions, as well as by preparing for the inevitable consequences of a changing climate. Listed in Table 1.2 in Chapter One are the draft General Plan Goals and Policies conditionally accepted by the City of Santa Cruz that pertain directly to climate change.

City of Santa Cruz Climate Action Program

As described in Chapter One, the City of Santa Cruz established the Climate Action Program and hired a Climate Action Coordinator in 2007 to complete the following responsibilities:

- Conduct the GHG Emissions Inventories
- Facilitate the completion of this Climate Action Plan
- Research municipal best practices in reducing greenhouse gas emissions and respond to climate change impacts
- Coordinate volunteer and consultant resources
- Coordinate City participation in regional climate change initiatives
- Support internal City staff efforts to reduce and respond to climate change
- Draft and evaluate proposed General Plan Action Programs
- Communicate the City's climate change efforts and initiatives

Planning Process

The City of Santa Cruz has used the 5 Milestone Process, a tool provided by Local Governments for Sustainability (ICLEI), as a framework for our climate change planning process. Figure 3.1 depicts the process, which includes the five main steps for a municipality to take once it makes a commitment to address climate change:

1. Conduct an inventory of local greenhouse gas emissions.

2. Set GHG reduction targets.
3. Complete a Climate Action Plan defining programs and actions that will achieve those targets.
4. Implement the Climate Action Plan, modifying it as needed.
5. Monitor and report on progress.

Figure 3.1 The 5 Milestone Process (ICLEI)

As previously discussed in Chapter 2, the City has completed its baseline Emissions Inventory as well as Inventories for 2000, 2005, and 2008. In 2006, the City established community-wide GHG reduction targets of 30 percent by 2020 and 80 percent by 2050 (compared to 1996 levels). The completion of this CAP, and its integration into the General Plan 2030, fulfills milestone three. In many cases, the implementation of this CAP is well underway, since the City has long been initiating, implementing, and expanding resource conservation programs that directly result in GHG emission reductions. In addition, during the process of drafting this CAP, much attention was given to creating momentum for its eventual full implementation, including building upon the successes of the City's and region's current programs, piloting new programs, seeking outside funding, and including measures and actions within the CAP that provide a framework necessary for its completion.

Climate Action Partners

The Climate Action Program staff has drawn on the experience and expertise of many individuals and groups during the process of drafting the Climate Action Plan. Below is a list of our primary partners in this process.

City of Santa Cruz–Internal Support Structure

The Climate Action Plan is the result of input, guidance, and assistance from City staff within many departments. These staff members bring years of expertise in their specialized fields that not only ensure high-level service, but also help conserve natural resources and reduce greenhouse gases.

City Mayor and Council

The Santa Cruz City Council and Mayors Reilly, Coonerty, Mathews, and Rotkin have been great supporters of the Climate Action Program and the development of the Climate Action Plan. The continued support by Council has been vital in setting Santa Cruz up for success in reducing GHGs and meeting current and future State mandates.

City Manager–Department Head Climate Meetings

The City Manager, Martin Bernal, has provided leadership in addressing climate change by hosting monthly meetings between the Climate Action Program staff and City department heads. These meetings have provided the oversight and guidance necessary to ensure that programs and actions defined within this CAP can be effectively implemented by City staff.

City Climate Action Workgroup

City staff has formed an interdepartmental workgroup that was responsible for providing ongoing support and guidance to the Climate Action Coordinator throughout completion of the GHG Emissions Inventories and the Climate Action Plan, as well as responding to the recommendations of the Climate Action Compact. In addition, the workgroup has helped develop programs to reduce municipal emissions, and build upon and expand current City programs. These include the Green Building Program, Monterey Bay Area Green Business Program, Climate Action Teams Program, and municipal efficiency and sustainable purchasing efforts.

Santa Cruz Climate Action Taskforce (SCCAT)

Completion of this Climate Action Plan required the dedicated time and attention of a core group of five City staff members, called the Santa Cruz Climate Action Taskforce (SCCAT). The SCCAT worked over the last two years to research and compile a com-

plete set of climate change-related goals, measures, and actions that make up the core of the Climate Action Plan. In order to do this, the SCCAT reviewed numerous other municipalities' climate action plans, the draft General Plan 2030, and all relevant City department plans. As well, staff reached out to many City and community partners for input.

Departmental Review

Staff from each relevant City department provided one-on-one review of the CAP goals, measures, and actions pertinent to their department. This in-person review process was instrumental in ensuring that the CAP best reflects departmental abilities, local, State and Federal requirements, and wherever possible, serves to support, leverage, and enhance current programs rather than create new ones. This review process also allowed for significant brainstorming opportunities that led to the addition of valuable new actions and mechanisms for implementation. This broad staff participation will ensure that the CAP is well integrated within department priorities for the future.

External Partners

Many sectors of the community have shown commitment to achieving notable reductions in GHG by 2020 and beyond. This CAP defines how the City will continue to leverage and build upon past and current programs to create a comprehensive and multi-faceted approach to reducing GHG emissions. As appropriate, the City will coordinate with other local and regional agencies such as Santa Cruz METRO Transit District, Santa Cruz County Regional Transportation Commission, and AMBAG. These efforts will emphasize innovation, partnership, education, and collaboration in the ongoing efforts to reduce GHGs and support and empower the entire community to adopt more sustainable business and lifestyle practices. This partnership between the municipality and its residents and businesses cultivates a sense of shared vision and common goals as well as facilitates ongoing collaboration and innovation in reaching those goals. Several of the successful partnerships are listed below:

Climate Action Compact

In September 2007, the County of Santa Cruz, the City of Santa Cruz, and the University of California at Santa Cruz along with many local businesses and nonprofits partnered to create a Climate Action Compact (CAC). The compact signatories recognized that while climate change is a global issue, the causes and effects of those changes must be addressed locally.

The goal of the CAC is to achieve meaningful and measurable progress toward lowering our local greenhouse gas emissions through the implementation of cooperative programs. To that end, the CAC partners initiated a process to develop regional actions needed to accomplish the goals outlined in the compact. Two of the most important goals are to develop partnerships with other local jurisdictions and to design a portfolio of potential cooperative projects to significantly lower GHG emissions and climate change impacts in our region.

Ecology Action

Ecology Action and City staff has been working together with other regional partners to develop collaborative ways to respond to climate change and reduce GHG emissions in our community. Ecology Action has been a critical partner, providing leadership and staff support in the development of the CAC as well as in the implementation of the Energy Upgrade California program.

Silicon Valley Joint Venture–Public Sector Climate Taskforce

The Silicon Valley Joint Venture (SVJV) established a Climate Taskforce to assist Silicon Valley and Silicon Beach cities to address AB 32. The Taskforce has agreed to develop effective and collaborative solutions for the reduction of greenhouse gas emissions in member jurisdictions by providing a neutral forum for city and county government agencies and special districts to learn about climate protection programs. The Taskforce has strived to: 1) accelerate the reduction of greenhouse gas emissions by public agencies, 2) use demand aggregation to conserve scarce public resources, 3) encourage and support the growth of the clean technology industry, and 4) provide leadership for the community and the world. The SVJV has provided an invaluable sounding board for staff of the participating jurisdictions that have been tasked with developing previously undefined programs to address climate change.

The City of Santa Cruz Climate Action Program staff recognizes the value of such a forum for city and county staff to collaborate, partner and share ideas, and has set a goal to develop a similar partnership for the Monterey Bay Area.

Public Participation and Discussion

Santa Cruz citizens and businesses have provided and will provide significant input, support and attention to our community's response to climate change and to the development of the CAP. It has been a priority for the Climate Action Program staff to be available to hear what our community has had to say. Dialog and the exchange of ideas with public partners have been encouraged through numerous forums.

The Climate Acton Coordinator was available in the following ways:

1. Attending and/or speaking at many community networking and discussion events, workshops, and environmental fairs such as Green Drinks, Earth Day, and SC Meet Up.
2. Setting aside Friday mornings to meet with anyone interested in supporting the development of the Climate Action Program. Several programs within this plan originated from Friday morning coffee meetings.
3. Holding public forums on topics such as Solar Santa Cruz.
4. Answering and responding to climate change related public queries.
5. Coordinating a thorough outreach program to get comment and feedback on the draft Climate Action Plan and revising the CAP accordingly.

Business Participation

Many local businesses and business groups have participated in the development of the Climate Action Plan. Both the Chamber of Commerce and the Santa Cruz Downtown Association have been open and willing partners in disseminating information for the development of this plan and providing comments. Several local businesses have provided invaluable time as test cases for new programs and have been important advocates within the business community.

Community Response to the Draft Climate Action Plan

The City of Santa Cruz conducted an extensive public review of the 2010 Draft Climate Action Plan. During the four-month review process, the Draft Climate Action Plan was made available on the City and 30x20.org websites, was presented at City Council, Planning, Water, Parks and Recreation, Downtown, and Public Works & Transportation Commissions meetings during which the members/commissioners as well as the public asked questions and submitted their comments. The Climate Action Coordinator attended many public events and organization/institution meetings during which the Draft CAP was presented, reviewed, and discussed. City Council members, City Planning, and Public Works staff met with community groups to discuss CAP priorities and direction. Staff created a Survey Monkey web tool to solicit feedback on the Draft CAP and received many comments via email. Literally hundreds of comments were received during the review process, every one of which was reviewed and where feasible, incorporated in some fashion into the final version of the CAP. Clearly, the community is vested in the implementation of this plan and in meeting our 2020 objectives.

How the Climate Action Plan Is Organized

The CAP actions are categorized for inclusion into one of the five chapters below. Each category focuses on specific energy uses and/or reduction strategies to achieve municipal and community goals. Each chapter of the plan briefly outlines the issues and current programs and then outlines programs and actions necessary to fully achieve the reductions for that sector.

Climate Action Plan focuses on different sectors as follows:

- Chapter 4: Energy Efficiency
- Chapter 5: Transportation and Land Use Planning
- Chapter 6: Water Use and Waste Reduction
- Chapter 7: Locally Generated Renewable Energy
- Chapter 8: Public Partnerships, Education and Outreach
- Chapter 9: Climate Action Plan Implementation Strategy

Chapter 4: Energy Use in the Built Environment

Many homes and businesses in the City are less energy efficient than they could be. Energy efficiency, in appliances, lighting, and insulation, has been proven an effective tool to significantly reduce energy use, emissions, and utility costs. Programs like the Green Building Program encourage new buildings to use sustainable and energy-efficient materials and techniques that have been shown to reduce energy use significantly. If building and land use patterns remain similar to those in recent years (2% of building stock annually), over 20% of the buildings will be re-

modeled or rebuilt using more efficient green building techniques by 2020, reducing energy use in those buildings by 50%.

Chapter 5: Sustainable Transportation and Land Use Planning

The General Plan 2030 outlines the land use strategies that will help to build a future community that is more efficient and sustainable. Infill and urban development within core business districts and along key transportation corridors will help to support greater use of available and new public transit options. The continued integration of safe bike and pedestrian paths within and among these areas will provide the safe corridors necessary to increase walking and bike ridership within the community. Community ridesharing programs are an inexpensive, easy, and efficient way of reducing transportation emissions. Transforming the community will take decades, but the policies and objectives within the General Plan provide the guidance to help Santa Cruz reach those ends.

Chapter 6: Water Conservation and Solid Waste Management

While water use and waste disposal practices may seem more like sustainability issues, they are actually very important to our climate action goals. The collection, treatment, and distribution of clean drinking water to our homes and businesses and the treatment and pumping of wastewater that takes place at the Wastewater Treatment Facility after the water goes down our drains is a large contributor to municipal emissions. The greenhouse gas emissions that are generated at the landfill from the decomposition of organic matter are also significant to our overall emissions inventory. Therefore, continued efforts to reduce water use and waste generation will further reduce our GHGs.

Chapter 7: Solar Santa Cruz–Renewable Energy

In order to meet the 2020 GHG reduction goal, energy efficiency and conservation alone will not be sufficient. Based on current City growth estimates and GHG emission trajectories, it is apparent that reductions must also include the switch from fossil fuels to renewable energy sources. City records show that while overall utility energy use has gone down in recent years, emissions fail to follow the same path due an increase in the carbon content of PG&E electricity.

Chapter 8: Sustainability through Public Partnerships, Education and Outreach

The current interest of the local community in climate change provides a unique opportunity to foster individual empowerment and collective action. Climate change is an overarching issue that calls for us to begin living within our means. The mitigation of and adaptation to climate change will require each one of us to examine and make changes in our daily decisions as well as look to each other for innovative solutions and support. Every one of us will need to play our part because reliance on the State and Federal governments, new technology, and more energy efficient infrastructure alone will not be enough for Santa Cruz to meet our 2050 GHG reduction goals.

Chapter 9: CAP Implementation; 1000 Steps (or 256 Actions) to Meet Our Goal

The final chapter outlines the nuts and bolts of how the goals, measures, and actions within the CAP will be achieved. The Chart of Potential Implementation Actions (Appendix A) within this CAP is a detailed list of actions the City and community can take to reach our GHG reduction goals. The actions are considered feasible and many have been tested and proven elsewhere as effective tools for the job. The Chart of Actions provides, for each priority measure and action, an estimated cost, a greenhouse gas reduction amount, timeframe, and lead staff and departments responsible for its implementation.

CAP Reduction Potential

The Climate Action Plan has been designed to spur dialog and motivate synergy among all sectors of our community. It is a collaborative document intended to define programs and processes to help everyone identify their potential role in reducing GHG emissions. Through the implementation of the CAP, the City will increase the depth and effectiveness of existing and new programs within the community, build a City-wide effort to reduce GHG emissions, and create avenues for new partnerships and ideas to be developed. The collaborative nature of this program is intended to change our perspective from a "What-can-

I-do?" attitude to one of community empowerment and action. By working together on many fronts we can achieve the reductions needed to meet our 2020 goals (illustrated in Figure 3.2).

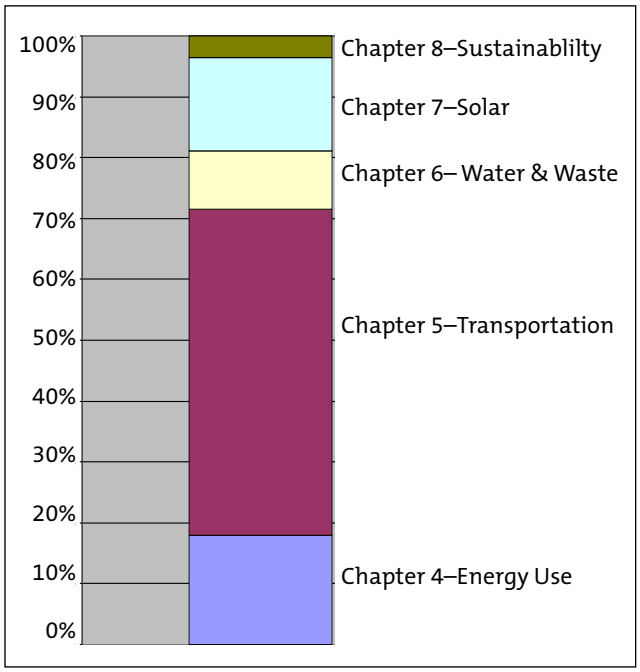


Figure 3.2 Climate Action Plan 2020 Reduction Potential (76,715 tons)

Cumulative GHG Reductions

City governments, local residents and businesses efforts to reduce GHG emissions will be supported by the actions of California State agencies, the State legislature and in some cases the US Government. Figure 3.3 depicts the cumulative reductions in GHG that will occur in Santa Cruz if all State and local initiatives are successful. The CO2 emissions have been estimated to increase by 12.2% (based on population growth patterns as predicted within the General Plan) if Santa Cruz had chosen to take no action to reduce emissions (Business as Usual, Figure 3.3). Government reports suggest that State initiatives to increase the renewable portfolio of the California's electricity generation, increased auto efficiency requirements and land use development guidelines that favor public transit will help to stabilize emissions to 1990 levels by 2020 and will reduce statewide emissions 13% by 2020. Those reductions in combination of local reductions achieved through implementation of the City of Santa Cruz Climate Action Plan will lead to a cumulative reduction of 37% by 2030 and set our community and California as a whole to meet our 2050 goals of 80% below 1990.

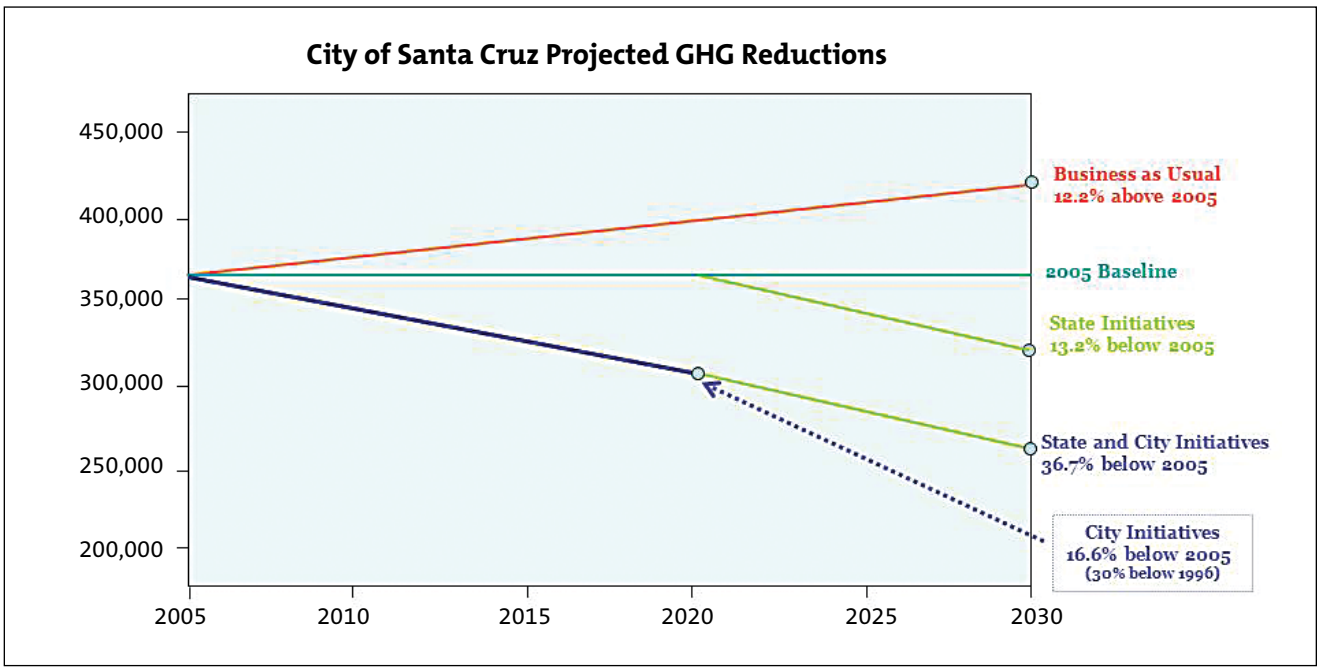


Figure 3.3 Cumulative GHG reductions of local and State efforts

4 ENERGY USE IN THE BUILT ENVIRONMENT

Over two hundred years of development in Santa Cruz and throughout California has left a building infrastructure of varying levels of energy efficiency. A lot of homes and businesses, including many City-owned buildings, waste energy due to poor insulation, energy intensive lighting and appliances, and old heating and cooling systems. The municipality has worked with PG&E and others to improve the efficiency of many buildings (Fig 4.1), but more is needed. Many municipal buildings are 80 years old or more, providing unique historical value but posing challenges to improved energy efficiency objectives.

Studies have demonstrated the great value and cost-effectiveness of weather-stripping, replacing single pane windows, old appliances and lighting, and increasing insulation in reducing energy use and saving money. While significant energy and cost savings have already been achieved through the implementation of such measures in Santa Cruz buildings, the potential for additional reduction is quite large. In fact, according to recent utility-level energy efficiency analyses, by 2013 as much as 500 million kilowatt-hours (kWh) of electricity and $76 million in costs could be saved in Santa Cruz County by replacing inefficient appliances alone. In addition, the County could save approximately 7.5 million therms of natural gas and over $7 million annually through weatherization.

The City has been a leader in energy conservation since the mid 1980s. Since that time, the City has systematically invested in new infrastructure and efficiency upgrades, making sound decisions on priorities and the use of new technology, The City installed:

- **LED street lights** installed in business districts (project 65% complete–saving 235,000 kWh and 71 tons of CO_2e per year)
- **energy efficient lighting** within all municipal buildings (savings about 241,000 kWh and avoids 130 tons of CO_2e per year)
- **high efficiency LED traffic signals** (savings about 610,000 kWh and avoids 220 tons of CO_2e per year)
- **a "Lights off at Night" program** for most municipal buildings (saving about $32,000; 242,000 kWh and 150 tons of CO_2e per year)

The Water Department has implemented efficiency projects focused on water conservation and water pumping, treatment, and delivery energy (saving an average of 36,560 kWh per year and has a cumulative reduction of about 1,300 tons CO_2e.

Figure 4.1 Existing local government GHG reduction activities

Goal for this Chapter

- **Significantly reduce energy use in municipal, residential and commercial buildings.**

Municipal Building Efficiency and Energy Use Reductions

The most direct role for any municipality in reducing GHG emissions in the built environment is through improved energy efficiency of its own buildings and infrastructure. These and other municipal conservation and efficiency efforts have led to an estimated 16% reduction in greenhouse gas emissions compared to what would have been emitted without these programs. Because of the City's past efforts, overall municipal energy emissions have remained constant since 1993.

Consistent levels of municipal emissions seen since 1996 (rather than expected declines) are the result of energy efficiency and conservation measures completed in unison with upgraded City services and enhanced environmental protections. In 1999, the City upgraded the wastewater treatment facility from primary to advanced secondary (a much higher level of treatment to protect coastal water quality) which increased energy use threefold for that facility. In addition, while municipal energy use fell between 2005 and 2008, the carbon content of every kWh of electricity produced by PG&E increased by 31%, causing CO_2e emissions to increase in 2008 for the municipal, commercial and residential sectors.

Municipal Energy Reduction Measures

Two key energy use reduction measures (Table 4.1) are to establish the Santa Cruz Municipal Energy Management Office and hire or designate a Municipal Energy Manager. The Municipal Energy Manager will coordinate energy use practices, efficiency upgrades, and future investment in renewable energy among City departments and services. The Municipal Energy Manager will work with department staff to identify funding resources such as municipal funds, municipal return on investment, and State and Federal subsidies for the coordinated implementation of the priority projects outlined within the Energy Efficiency and Conservation Strategy (EECS) described below. Until resources are secured for the Municipal Energy Manager, efficiency efforts will continue to be addressed by individual departments.

Municipal Sector

1. Formalize a Santa Cruz Municipal Energy Management Office to coordinate energy use practices, efficiency upgrades, and future investment in renewable energy among departments and services.
2. Implement the Energy Efficiency Conservation Strategy (EECS) to reduce energy use in municipal buildings by an additional 40% by 2020.
3. Integrate new efficient equipment and reduction measures into the EECS for the wastewater treatment and collection system to reduce energy use 10% below 2005 values.
4. Integrate new energy efficient equipment and reduction measures into the EECS for the Water Department to reduce energy use 10% below 2005 values.
5. Integrate new energy efficient equipment and reduction measures into the EECS for the Information Technology Division to reduce energy use 10% below 2005 values.

Table 4.1 Municipal Energy Efficiency Measures

Until recently, the City had not established municipal-wide energy efficiency and renewable energy generation objectives or identified mechanisms to evaluate priority projects within or among departments. Instead, various departments had independently invested resources to implement energy efficiency and solar energy projects. The American Recovery and Reinvestment Act of 2009 (ARRA) provided funding and an incentive for Santa Cruz to invest in energy efficiency and renewable projects in a more systematic and coordinated way. In order to take full advantage of the ARRA funding as well as future State incentives and grant opportunities, City staff from various departments began working collaboratively to establish a process to evaluate and prioritize municipal energy efficiency and solar projects. The result of these efforts is the Energy Efficiency and Conservation Strategy (EECS), which was recently adopted to establish a prioritization process and an initial list of priority projects to implement amongst all City departments to reduce energy use and save money.

The Water Department and Wastewater Treatment Facility are the two largest municipal users of

electricity. It is notable that these utilities provide service to a greater area than the City boundaries. The Municipal Energy Manager will work with these departments to identify opportunities and prioritize projects for implementation. These actions will increase energy efficiency and on site generation of renewable energy to reduce emissions at both facilities by another 10% by 2020.

Tracking and Reporting

The Municipal Energy Manager will be responsible for tracking and reporting the progress of the EECS, quantify GHG emissions reductions, and support the periodic update of the EECS.

Residential Reductions

Over the past 15 years, the combined influences of energy efficiency rebate programs, a public education campaign, and significant increases in energy prices have led to a 22% reduction in energy use within Santa Cruz homes. While this drop in energy use is remarkable and significant, with the 2001 California energy crisis behind us, home energy use in Santa Cruz is again on the rise, although still far below 1996 levels[16]. The Climate Action Program will work with partners to further incentivize energy efficiency within residential properties as described below (Table 4.2).

Residential Sector

1. Increase market penetration of the Green Building Program to 10% of residential buildings by 2020.
2. Partner with others to create tools and incentives for landlords to invest in home weatherizing and energy efficiency upgrades for off campus student housing to obtain 50% penetration of the 52% of UC Santa Cruz students who live off campus by 2020.
3. Expand participation in energy efficiency upgrade programs to 25% of all homes within the City by 2020.

Table 4.2 Residential Energy Efficiency Measures

16 City of Santa Cruz 2008 GHG Inventory

Reaching Our Residential Energy Efficiency Goals

In order to reach the residential efficiency measures listed in Table 4.2, the City will focus on providing residents ways of overcoming the following hurdles to implementing energy efficiency measures in their homes:

1. **Information.** Lack of information on the simplicity and cost effectiveness of these measures and a focus on the more technological and attractive options such as solar PV. Many still do not have an understanding of the amount of energy and money that can be saved by simple and cost effective insulation improvements and lighting and appliance upgrades.
2. **Link to Resources.** A broad range of efficiency programs are currently available that provide incentives for purchasing energy efficient equipment and technical support for the design, construction, and retrofit of energy-efficient buildings and homes.
3. **Upfront costs.** Many see investments of hundreds or thousands of dollars as a cost rather than an investment with a quick return. Financial examples of pay-back rates on various efficiency investments may reduce this hurdle. The utilities are preparing a two-fold increase in funding for cost-effective energy efficiency programs over the next few years, which may help reduce this hurdle.
4. **The renter/landowner challenge**. An estimated 50% of City residents rent their homes and sometimes are not inclined or able to invest in home energy-efficiency upgrades beyond installing efficient lighting because measures such as improved insulation and high-efficiency appliances are seen as an investment in another's property, which is often financially or legally infeasible. On the other hand, there is little economic incentive for a landlord to invest in energy-efficiency upgrades since most energy bills are paid for by the renter. Distributing educational materials to realtors and landlords on the value of energy efficiency upgrades along with information on current upgrade subsidy and rebate programs at the time of sale may begin to bridge this gap.
5. **Time.** Few have the time to make replacement of inefficient appliances and improved home insulation a priority when their current situation works.

Providing information on the benefits and opportunities for people to make the commitment and take those steps (Earth Day, Climate Action Teams, etc.) can help people make the time.

Given the fact that, as a local municipality, we have few direct opportunities to mandate residential and commercial energy efficiency upgrades other than through building codes and possibly through time of sale requirements, the City has identified three primary objectives for supporting residents and businesses in meeting our greenhouse gas reduction goals for energy efficiency:

1. Focus on expansion of the City Green Building Program and the Monterey Bay Area Green Business Program.
2. Expand, streamline, package, and market current energy efficiency education, rebate, and direct service programs in order to encourage residents and businesses to take advantage of them.
3. Expand partnerships with those already active in providing energy retrofit services or forming new partnerships that support these efforts.

City of Santa Cruz Green Building Program

In 2005, Santa Cruz became one of the first municipalities in the nation to require new construction to include the adoption of environmentally superior building materials and designs. Builders in Santa Cruz now use best practices for their construction projects that enhance building energy efficiency and water conservation as well as to improve air quality, waste reduction and recycling, and runoff and erosion control. The Green Building Program currently includes residential and commercial development, but does not yet include commercial interior remodels. The Green Building Program has also succeeded in encouraging the entire local building community to invest in additional training and the use of new materials and technology that otherwise would have been left to a niche market.

As Table 4.3 shows, a recent evaluation of the Santa Cruz Green Building Program estimates that a Green Award-winning home is twice as efficient as the current building stock[17]. A Green Building Award -winning building has achieved a level of efficiency and sustainability (use of renewable and nontoxic materials) above and beyond that required for permitting. These buildings may (or may not, in some cases) cost slightly more in materials and design, but are being found to rapidly repay the owners through energy cost savings and improved livability.

Table 4.3 Results of a recent evaluation of energy use in an average home compared with homes built under the City's Green Building Program.

Type of Home	Average Annual Emissions (tons CO_2e)
California Home	10 to 14 tons
European Home	5 tons
Santa Cruz Home 1990	4.3 tons
Santa Cruz Home 2008	3.25 tons
Santa Cruz Green Building Award Winning Home	2.2 tons

Since home energy conservation and efficiency remain the most cost-effective way to meet the community-wide greenhouse gas emissions reduction goals, continued efforts to make Santa Cruz homes as efficient as possible are a top priority. Climate Action Program staff recommends that city homes take action to reduce home energy use cumulatively to 35% below 1990 levels (2.8 tons per home average emissions) through the expansion of the Green Building and other energy efficiency programs as an aggressive yet achievable goal that will take full advantage of new efficiency opportunities and allow for future infill development.

Commercial Buildings

There are an estimated 1,104 commercial and industrial buildings within Santa Cruz. These buildings range from small family-owned businesses to large commercial and industry buildings. Like the residential sector of our community, many businesses have already made investments in energy efficiency upgrades as well as solar energy generation, resulting in a reduction of greenhouse gas emissions of 21%. Again, while this reduction is significant, there are still many cost-effective energy efficiency upgrade and cost-saving opportunities available for businesses.

17 2010 Green Building Program Survey

Reaching Our Commercial Energy Efficiency Goals

Unlike residential energy use, which is fairly standard in type and scale, business energy use is distinct to the type of business and often requires professional analysis to define opportunities. The Climate Action and City Green Business programs will leverage existing programs and services to address the business community's unique set of needs.

Commercial Sector

1. Increase participation in the Monterey Bay Area Green Business Certification Program by 250 additional businesses within the City by 2020.
2. Increase market penetration of the Green Building and LEED Programs to 10% of the commercial and industrial space by 2020.
3. Increase the amount of energy efficient commercial space within the City to 30% by 2020.

Table 4.4 Commercial Energy Efficiency Measures

Monterey Bay Area Green Business Program

In 2003, several public and private agencies in the Monterey Bay Area formed the Monterey Bay Area Green Business Program (GBP). The GBP is an incentives-based program designed to encourage businesses to meet or exceed environmental standards in areas including water conservation, waste reduction, storm water and wastewater pollution prevention, energy efficiency, air pollution prevention, and hazardous waste handling. Leveraging the GBP efforts in helping businesses define further actions and long-term goals to reduce GHG emissions and energy use 30% by 2020 is the City's key strategy for the commercial sector of our community.

As described in more detail in Chapter 8 of this plan, one way the City intends to partner with local businesses to address climate change is to support a Climate Change Mitigation component for the GBP that will enable businesses to measure their current greenhouse gas emissions, quantify the GHG reductions achieved through actions taken for GBP certification, and prioritize future actions to significantly reduce future emissions. The GBP provides guidance on many energy efficiency actions specific to various types of businesses and information on how implementing these actions will reduce energy use, GHG emissions, and costs to the business. The Green Business Coordinator will work with regional partners to improve the certification process, better market the environmental and climate related values the program provides, and build linkages among energy efficiency services and the certification process. Leveraging and expanding the GBP in these ways, as well as providing greater recognition of the certified Green Businesses will benefit both the climate and the local economy.

City Commercial Green Building Program

Santa Cruz has implemented a Green Building Program for commercial buildings since 2009. With the recent State adoption of minimum green building requirements for the Cal Green Program, the City has begun updating our Commercial Green Building Program to integrate these minimum measures and enhance the energy efficiency sections of the program for new construction as well as additions and remodels. The Green Building Program will also be expanded to include minimum measures for tenant improvements associated with interior remodels to current commercial space; which makes up a significant portion of business remodels. This addition will help to integrate energy efficiency standards into many commercial remodel projects that currently are not supported by the Green Building Program; helping the CAP to meet our commercial reduction goals and supporting efficiency and cost savings within the business sector.

Partnerships

There are several successful local and regional programs that provide resources for residents and businesses to improve the energy efficiency of their properties. Table 4.5 describes the most prominent current key programs partners. Actions defined in the CAP focus on expanding the capacity and increasing the penetration of these current programs within target sectors of the community rather than creating new programs. These programs provide subsidies and technical information that can help participants initiate and complete energy efficiency retrofits. If all residents and businesses took full advantage of the current rebates and incentive programs, the prescribed green-

Commercial Sector

Central Coast Energy Services, Inc. is a not-for-profit organization that fosters community health and well-being by providing energy conservation, consumer education & advocacy, home improvement, utility assistance, and job training to people in need. Central Coast Energy Services (CCES) strives to improve household safety, health, and economic security within our communities. Funding is provided by a number of sources with the largest being the federal government through the State of California. **www.energyservices.org**

RightLights is a full-service program for the commercial sector designed to minimize the capital outlay and time required to complete an energy efficiency upgrade/retrofit project. The RightLights Program provides subsidized energy efficiency upgrades of lighting and refrigeration systems, with free professional assistance to help businesses lower their energy bills and boost their cash flow. Updated lighting and refrigeration equipment that operates more efficiently may reduce maintenance costs and downtime. Funding for the RightLights program is provided by utility users through PG&E grants. **www.rightlights.org**

AMBAG Energy Watch provides energy assessments, retrofit project incentives, and direct installation measures to increase energy efficiency in municipal facilities and local hotels and motels. AMBAG also conducts home energy surveys for homeowners and renters, providing a written analysis of energy-saving strategies for the home, free compact fluorescent bulbs (as desired) to replace incandescent bulbs, and information about additional energy-saving programs and opportunities. **www.ambag.org/programs/EnergyWatch**

PG&E Energy Savings and Rebate Programs PG&E consultants, market partners, trade professionals, and industry experts provide an objective view of a business' energy use to determine the right energy efficiency solutions. As the first step toward a comprehensive energy management plan, PG&E offers no cost energy audits. PG&E has also developed an Automated Benchmarking Service that enables building's monthly energy use to be automatically uploaded into the EPA's ENERGY STAR® Portfolio Manager to evaluate energy use and set reduction goals. PG&E also provides other energy management solutions including cash rebates and financial incentives. **www.pge.com/mybusiness/myaccount/analysis**

Energy Upgrade California Energy Upgrade California is a new, statewide program run by Ecology Action that offers incentives to homeowners who complete select energy-saving home improvements on a single-family residence. These incentive packages encourage customers to take a "whole house" approach by combining several related improvements at once to increase a home's overall energy efficiency and achieve greater savings. **https://energyupgradeca.org/**

Table 4.5 Regional Energy Efficiency Program Partners

house gas reductions from energy efficiency could be realized. City staff will continue to work with these partners to better integrate their programs with the City's programs as well as package and market them to the public to reduce the time and cost to the home and business owners who wish to take advantage of all possible services.

Tracking and Reporting

The Climate Action, the Green Business, and Green Building Programs will be responsible for tracking and reporting the increase in energy efficiency improvements of residential properties and the number of green building commercial properties and in square feet of energy efficient commercial space.

Chapter 4. ENERGY USE IN THE BUILT ENVIRONMENT

MUNICIPAL SECTOR				
Measures	Description of Costs	Estimated Cost $	Key Departments & Staff	Emissions Reductions (tons)
1. Formalize a Santa Cruz Municipal Energy Management Office to coordinate energy use practices, efficiency upgrades, and future investments in renewable energy among departments and services.	Costs will be to hire an Energy Office Manager, to hire consultants to design and implement infrastructure upgrades. (Energy savings from projects will decrease overall costs to the General Fund).	Medium Cost Effort	Fleet & Facilities Operations & Energy Management Office	in M2
2. Implement the Energy Efficiency Conservation Strategy (EECS) to reduce energy use in municipal buildings by an additional 40% by 2020.	Implementation of the 2009 EECS has been supported by Federal ARRA funds.	Large Cost Effort	Energy Management Office	553
3. Integrate new energy efficient equipment and reduction measures into the EECS for the wastewater treatment and collection system to reduce energy use 10% below 2005 values.	Costs will be in time allocated to current staff to investigate and scope out new projects.	Small Cost Effort	Energy Management Office & Public Works	416
4. Integrate new energy efficient equipment and reduction measures into the EECS for the Water Department to reduce energy use 10% below 2005 values.	Costs will be in time allocated to current staff to investigate and scope out new projects.	Small Cost Effort	Energy Management Office & Water Dept	148
5. Integrate new energy efficient equipment and reduction measures into the EECS for the Information Technology Division to reduce energy use 10% below 2005 values.	Costs have been paid through the 2009 ARRA grant	Medium Cost Effort	IT department	40
RESIDENTIAL SECTOR				
1. Increase market penetration of the Green Building Program to 10% of residential buildings by 2020.	Costs will be for current Green Building staff to implement this project.	Small Cost Effort	Green Building, Parks and Rec	1,017
2. Partner with others to create tools and incentives for landlords to invest in home weatherizing and energy efficiency upgrades for off campus student housing to obtain 50% penetration of the 52% of UC Santa Cruz students who live off campus by 2020.	Costs will be for current Climate Action staff to implement this project.	Small Cost Effort	Climate Action Program & Green Building Program	396
3. Expand participation in energy efficiency upgrade programs to 25% of all homes within the City by 2020.	Costs will be for current Climate Action staff to implement this project.	Small Cost Effort	Green Building, Water Department	5,086
COMMERCIAL SECTOR				
1. Increase participation in the Monterey Bay Area Green Business Certification Program by 250 additional businesses within the City by 2020.	Costs will be to double funding for the City's Green Business Coordinator to manage both the certification process and to implement additional outreach and development efforts.	Medium Cost Effort	Green Business	3,750
2. Increase market penetration of the Green Building and LEED Programs to 10% of the commercial and industrial space by 2020.	Costs will be for current Green Building staff to implement this project.	Small Cost Effort	Green Building Program	1,199
3. Increase the amount of energy efficient commercial space within the City to 30% by 2020.	Costs will be for current Green Building and Green Business staff to implement this project.	Small Cost Effort	Green Business, Green Building	1,199

Note:

Small Cost Effort	Costs to City will be from current staff time being allocated to this Measure
Medium Cost Effort	Costs to City will be from the need to hire additional staff to complete this Measure
Large Cost Effort	Costs to City will be to hire additional staff or consultants and/or for equipment and construction costs to complete this Measure
Large but Anticipated Cost Effort	Costs to City will be to hire additional staff or consultants and for construction costs to complete themeasure. Some of the costs will offset budgeted maintenance costs of City infrastructure

5 SUSTAINABLE TRANSPORTATION & LAND USE PLANNING

Like the many California coastal towns founded before the State itself, Santa Cruz was originally developed prior to the invention of the automobile. Early residents relied on horse-and-carriages and trolleys to get around. Santa Cruz was initially developed to accommodate this type of movement. The City got its first streetcar line in 1875. The horse-drawn vehicles ran on a line that connected downtown with Beach Hill and the wharf and eventually to east Santa Cruz along Soquel Avenue. The system was electrified and expanded in the 1890s and, by 1895, major new lines ran along Mission Street and down Younglove Avenue and Woodrow Avenue, as well as off Soquel Avenue down Cayuga Street. Housing was built along these lines and when additional lines were added along Water Street and Morrissey Boulevard from 1900 through 1910, housing followed suit.

What had taken years to develop literally disappeared in a few months when, in 1926, the streetcars were replaced with motorized buses. All that remains of the system are roads such as Woodrow Avenue and Younglove Avenue, which were originally laid out with a center median strip for trolley tracks and are now just exceptionally wide residential streets . By the 1940s, personal automobiles had become the

main mode of transportation. With the automobile came the need for new infrastructure and, like most cities, Santa Cruz spent much of the 20th century developing and improving infrastructure to support movement by car. Today, Santa Cruz has 140 miles of paved roads, 22 public parking lots in the downtown area, and 19 gas stations. Greenhouse gas emissions from transportation make up 46%, of our community totals and require us to reevaluate future planning and infrastructure priorities.

While automobile infrastructure has received the majority of attention and funding during the past century, over the last three decades, the City has also substantially improved infrastructure for other modes

18 **Excerpt from:** *Fully Developed Context Statement for the City of Santa Cruz*. Prepared for City of Santa Cruz Planning and Development Department by Susan Lehmann, October 20, 2000.

of transportation, especially bicycles with 57 miles of dedicated bike lanes and paths. Despite these improvements, a significant and prolonged effort is needed to meet our transportation-related GHG reduction goal over the next 10 years. Our transportation objective to meet an 80% reduction in GHG emissions by 2050 will be accomplished largely by providing low-carbon transportation options that rival the efficiency and safety of the automobile.

Goals for this Chapter

- **Reduce GHG emissions by reducing vehicle miles traveled, decreasing single occupancy vehicle travel, and increasing the use of alternative fuels and transportation options.**
- **Promote land use strategies that encourage higher density development along transit corridors and activity centers to support efficient, accessible, and sustainable transportation options.**
- **Implement the City's General Plan including programs related to alternative transportation.**

Pieces of the Puzzle

Moving from a single occupancy automobile-centric, resource intensive environment to a community that includes transit- and pedestrian-centered corridors and that focuses on integrated, mixed-use development will be a complex, costly, and lengthy process. It will require dedication, cooperation, and financial commitment to achieve this transition. Fortunately, within Santa Cruz, many of the necessary planning processes to create a more sustainable transportation infrastructure are in place. The CAP intends to build upon these to help us meet our goals.

Regional Blue Print Process (SB 375)

In 2008, California enacted Senate Bill 375, which increases the State's ability to meet its AB 32 GHG reduction goals by setting the framework for how it will reduce transportation-related emissions. The bill directs the California Air Resources Board and local air resources boards to develop regional GHG emission reduction targets for passenger vehicles for each region covered by one of the State's 18 metropolitan planning organizations (MPOs). Our region's MPO, Association of Monterey Bay Area Governments (AMBAG), is then required to prepare a Sustainable Community Strategy (SCS) that outlines how our region will meet these GHG reduction targets through integrated land use, housing, and transportation planning. SB 375 also established incentives for its implementation that allow for streamlined environmental review of new residential and mixed-use projects that meet specific criteria consistent with the SCS.

It is an underlying assumption of SB 375 that coordinated transportation, housing, and urban planning will lead to a greater demand for alternative transportation options, resulting in some decreases in traffic congestion and related GHG emissions. The State Air Resource Board, Regional Targets Advisory Committee stated "now that the federal interstate highway system is in place, investments should turn toward safety and maintenance of existing systems, and the build-out of robust transit networks." While the committee has made numerous recommendations regarding how the State could reduce costs and bureaucratic procedures for public transit projects, it also acknowledges our biggest implementation challenge:

"…successful implementation of SB 375 will depend on our ability to meet this increased demand for transit options. However, California's continued trend of eliminating State sources of transit capital and operating funds presents an implementation dilemma. Without restoration of State sources of transit funding that are reliable and long term, it will be unrealistic for transit to meet any increased demand in services. This will diminish the State's ability to achieve its greenhouse gas emission reduction goals….. Without such resources, it will be difficult to ask local elected officials to make decisions that may reduce emissions while, in some instances, placing economic burdens on their communities. In addition, current transportation funding available for operations and maintenance of the city, street, county road and transit systems falls woefully short of the needs."[19]

Adequate financial support must be provided by the State and Federal transportation funding agencies as we undergo the transition to a sustainable transportation infrastructure. As mentioned above, those resources are being cut by the State rather than increased, leaving significant uncertainties as to how to prioritize and implement infrastructure projects and

19 California Air Resources Board, *Recommendations of the Regional Targets Advisory Committee (RTAC) Pursuant to Senate Bill 375. www.arb.ca.gov/cc/sb375/rtac/report/092909/finalreport.pdf*

land use plans without adequate commitment by the state to provide the resources to make transit a real option for most.

Under SB 375, the SCS must identify a regional development pattern and transportation system that can meet the regional greenhouse gas targets from the automobile and light truck sectors for 2020 and 2035. The Blueprint planning effort piloted a comprehensive regional planning process in the Monterey Bay Area over the course of the last three years. It introduced regional concepts of sustainable growth to local planners, elected officials and residents while providing AMBAG staff with a better understanding of how to negotiate the often conflicting interests of the region's stakeholders.[20]

CARB adopted the following targets for the Monterey Bay Area in September of 2010:

2020: 0% increase from 2005 per capita GHG emissions levels

2035: 5% reduction from 2005 per capita GHG emissions levels

The AMBAG Board recently approved the plan "Envisioning the Monterey Bay Area: A Blueprint for Sustainable Growth and Smart Infrastructure". Commonly referred to as "The Blueprint," this plan lays the foundation for the development of the region's first Sustainable Communities Strategy. Obviously, multiple actions will be needed in addition to those to be outlined in the Sustainable Communities Strategy to meet AB32 and City GHG reduction goals for transportation.

General Plan Update

The City is currently completing a comprehensive revision to the General Plan that outlines the goals and policies for future development within the community. The General Plan update envisions a Santa Cruz of 2030 that is "a compact, vibrant city that preserves the diversity and quality of its natural and built environments, creates a satisfying quality of life for its diverse population and workers, and attracts visitors from around the world". A key principle in achieving that vision is the need to provide "an accessible, comprehensive, and effective transportation system that integrates automobile use with sustainable and innovative transportation options – including enhanced public transit, bicycle, and pedestrian networks throughout the community."

The successful implementation of the General Plan infill policies will rely on the convergence of livable community planning and effective alternative transportation planning and project implementation. Such coordinated success relies on the efforts of City staff, regional partners, and the public, all working towards similar goals and on similar timelines. Such coordination is underway but will need to be expanded and emphasized as the General Plan is implemented.

Master Transportation Study

In 2000, the University and City of Santa Cruz partnered to create the Master Transportation Study (MTS) to help define the way forward toward a safe and sustainable transportation future for Santa Cruz. This document was accepted by Council and is used as a tool to inform transportation decisions. The following four main objectives emerged from that process:

1. Expand and offer new travel choices for people who live, work, play and visit Santa Cruz
2. Provide relief for City-wide vehicle traffic congestion
3. Enhance community livability
4. Achieve a sustainable transportation future

These objectives are the foundation for the MTS, which lays out ideas to integrate pedestrian, bicycle, transit, and vehicle transportation initiatives to support the General Plan 2030, the City's zoning ordinance, UCSC's Long Range Development Plan, and other City and regional transportation planning documents.

The following strategic initiatives are identified within the MTS and are integrated within the General Plan 2030 and this Climate Action Plan.

- **Land Use:** Establish walkable, mixed-used, transit-oriented village centers along the transit corridors.
- **Transit:** Link local and regional centers with high-occupancy, high frequency transit service that will maximize ridership. Transit service that moves independent of vehicle congestion will be given priority.
- **Pedestrian System:** Complete, maintain and enhance the pedestrian network to encourage walking for both transportation and health benefits.
- **Bicycle Initiative:** Interconnect the bicycle net-

[20] AMBAG 2011 *Sustainable Communities Strategy & the Monterey Bay Area*

work and provide new safety, security and transit-oriented design elements to encourage cycling.

- **Livable Streets and Pedestrian-Oriented Design:** Emphasize multi-modal street design to create livable streets and enhance transportation choices.
- **Regional Planning:** Develop partnerships for regional and local transportation and land use solutions.
- **Investment Priorities:** Prioritize investments to ensure long-term transportation sustainability and achieve a "triple bottom line," integrating economic, ecological and social improvements. Preserving and maintaining all transportation modes, services, and infrastructure shall be the first priority.

Since its completion, the City has implemented many multi-modal projects including some of those outlined in the MTS. Through the continued implementation of actions recommended in the MTS over the next decade, the City will be able to reduce within-town auto trips while improving other modes of movement.

2008 Bike Plan

The 2008 update of the City Bicycle Transportation Plan aims to continue the community's successful enhancement of bicycle infrastructure and by doing so, increase the number of residents using bicycles as a common mode of transportation within the city. The emphasis of the 2008 plan aims to complete connector projects that can get bicyclists from origin to destination easily and safely. Implementation of plan will create a "detailed network of routes" to provide a greater range of commute options. The Bike Plan was designed do be consistent with the General Plan 2030. This Climate Action Plan outlines collaborative planning processes that will ensure that the Bike Plan supports the infill policies of the General Plan 2030.

Priority short term actions within the CAP are intended to encourage implementation of the portion of the 2008 Bike Plan that eliminate gaps and bottlenecks in current bicycle infrastructure and connect the City's major activity and employment centers. While no survey has been completed lately, discussions with public stakeholder groups suggests that, once complete, the City should see an increase in within-town bicycle trips of more than 100%.

Regional Business Efforts

There are many unique collaborative opportunities that the Climate Action Program will explore with the RDA including ways to enhance telecommuting that enables people to work locally with Silicon Valley businesses. Since 1994, a consortium of public and private health, education, human service, and civic organizations have sponsored the Community Assessment Project of Santa Cruz County (CAP), a collaborative project to measure and improve the quality of life in Santa Cruz County. The Community Assessment Program (CAP) has nurtured and encouraged a common community focus by establishing Community Goals for improvement, several of which address the climate reduction and sustainability objectives of this plan. Specifically the Community Assessment Project identifies ways to support a more sustainable local business economy and protect the natural environment. Specific Recommendations within that plan will support a reduction in employee commutes to and from Santa Cruz. Initiatives include:

- By the year 2015, Santa Cruz County will leverage educational opportunities and academic institutions as engines to fuel economic growth and technology transfer better than similarly situated counties in California.
- By the year 2015, increase the percentage of economic activity within Santa Cruz County by 10% and "re-localize" 10% of our commuting workforce.
- By the year 2015, Santa Cruz County will slow or stop the contraction of municipal budgets through economic development of the underlying economy.
- Develop and maintain a Broadband Master Plan for prioritizing connectivity needs in future years, with an emphasis on delivering high bandwidth services to Santa Cruz's industrial and commercial land use districts and community anchor

Fiber Policy Development

While physically located less than 25 miles from the heart of Silicon Valley, Santa Cruz is a geographically isolated community. Bordered by the coastal mountain range to the east and the Monterey Bay on two sides, the physical characteristics of the geography, and its relatively small population base, provide an economic disincentive for the development of the physical assets that make up the backbone of the internet. To ensure that there is fast and secure internet

that will enable Santa Cruz to support new high-tech businesses, the City has prioritized the development of policies that lower the barriers to develop new fiber routes within City limits through the development of a Broadband Master Plan. This effort will help to "re-localize" 10% of our commuting workforce and significantly reduce "over the hill" commutes.

Filling In the Gaps

Many projects within the region already stand out as actions taken towards a new multi-modal transportation future. The new bridge over the San Lorenzo River provides a linkage for bikes and pedestrians between the Ocean Street corridor and the downtown area, providing a safe alternative route to using Highway One. The new round-about near the wharf provides a safer and more efficient way of moving through that area both by car and on foot or bike. Other infrastructure projects, such as the Arana Gulch Park Master Plan and multi-use trail, still face barriers to implementation that will require solid leadership and strategic partnerships. The City is consistently successful in leveraging city resources to bring in outside funding to complete many of these projects. As we continue to make the transition from our current transportation infrastructure to a more multi-modal and sustainable community, the CAP recommends putting more pieces into place that will create the sturdy foundation necessary to meet the objectives and challenges that lie ahead.

Municipal Reduction Measures

The City will focus on the following reduction measures to reduce its own transportation emissions as well as support more coordinated efforts to create viable alternatives to the automobile for the local and regional community.

Sustainable Transportation and Land Use Planning

It is clear that in order for the City to successfully implement the General Plan, greater coordination amongst the Planning and Community Development Department, the Economic Development and Redevelopment Agency, and the Public Works Department is necessary. To date, the Planning and Community Development Department has been responsible for development and execution of the local zoning and land use plans. The Economic Development and Redevelopment Agency has been responsible for retaining existing businesses, attracting new businesses to the community, and the strategic reinvestment in the City's greater commercial areas. The Redevelopment Agency has also been largely responsible for the Cities success at increasing higher density affordable housing. The Public Works Department has been responsible for transportation planning and project implementation. While there are many areas of overlap and coordination among these responsibilities, a more structured approach will be required to meet current regulations and General Plan goals. Current State legislation and regional planning processes imply the need for municipalities to establish more integrated planning and development procedures. The better integration of alternative transportation options with new infill development outlined in the General Plan 2030 dictates that the Planning Department more effectively coordinate with other departments regarding the long-term prioritization of transportation-related infrastructure projects.

Therefore, the CAP recommends establishing a Sustainable Transportation and Land Use Planning Team made up of staff from the City Department of Planning and Community Development, Economic Development and Redevelopment Agency, and Public Works Department to ensure an integrated planning and program implementation process that meets local and State GHG reduction goals. The Team will work together to play a more effective role in regional transportation planning efforts including AMBAGs implementation of SB375 and the RTC's development of the rail corridor, both of which integrate

Municipal Sector
1. Reduce City fleet vehicle emissions by 20% by 2020.
2. Establish a Sustainable Transportation and Land Use Team among the Public Works, Planning, and Economic Development and Redevelopment Departments.
3. Support implementation of the General Plan infill policies.
4. Continue to play a leadership role in the county and regional transportation working groups.

Table 5.1 Municipal Transportation Measures

regional land use planning, transportation planning, and greenhouse gas reduction opportunities. Such coordination currently occurs on a project specific as needed basis. Creation of a working team will help establish priorities and monitor success.

The Team will also play a key role in the prioritization and implementation of the actions outlined in Chapter 5 of the CAP. The Team will report annually to Council as a way ensure that the City has been successful in meeting our interim milestones and GHG reduction measures, provide a way for the Team's efforts to be recognized by Council and the public, and give the public the information necessary to provide constructive feedback to the Team regarding future priorities and opportunities to further meet CAP objectives.

A key limitation within the City Planning and Public Works Departments is the lack of a dedicated Transportation Planner to fully implement the land use and transportation policies defined within the 2030 General Plan and CAP. The SCCAT team and the City Climate Action Work Group have identified the value of establishing a Transportation Planning position to fulfill these roles and actively participate on the Team.

Improved Communication and Collaboration

Public comment on the Draft CAP identified many issues that were not adequately addressed in the document that, if left out, would hinder its full implementation. The most common public comment was an interest in increasing the opportunities for clear lines of communication between the public, bicycle riders and advocacy groups, and City staff about the prioritization of new projects that increase bicycle use within Santa Cruz. While bicycle advocates often recognize the great progress the City has made at improving bicycle infrastructure, they continue to advocate for better services and seek continued opportunities to participate. The establishment of the Sustainable Transportation and Land Use Planning Team aims to improve avenues of communication with the public, support the prioritization of projects to meet specific objectives, and better quantify and report the success of these projects in meeting our interim goals. Priority projects should be integrated with the TIF and CIP efficiently to meet 2020 goals.

General Plan Policies

The infill policies of the General Plan can lead to significant GHG reductions and manage auto congestion only if the necessary infrastructure is provided to enable residents to choose safe, efficient, and pleasurable alternatives. The success of the infill policies of the General Plan in reducing single occupancy auto use is also reliant on an effective and well-funded METRO bus system and selectively improving capacity in a safe manner. Without the investment in an efficient street system and alternative transportation resources, infill policies will not be successful in providing the "walkable, mixed use, transit-oriented village centers" described in the Master Transportation Study and embodied in the General Plan 2030. The transportation team will work to ensure key projects are prioritized to support infill development above and beyond those necessary to mitigate traffic impacts (as defined in the TIF).

Land Use Planning–Update of ADU and Parking Policies

The purpose of the City of Santa Cruz Accessory Dwelling Unit (ADU) Development Program is to:

- Implement the development of well-designed ADUs in the City of Santa Cruz;
- Help minimize the impact of population growth on the community by providing more rental housing in the developed core of the City;
- Promote infill development to help preserve the surrounding natural greenbelt;
- Foster the use of public transportation within the City.

ADUs provide housing opportunities through the use of surplus space either in or adjacent to a single-family dwelling. In most cases they are either a garage conversion or a small backyard cottage or guest-house style structure.[21]

The ADU Development Program is designed to encourage development of small-scale neighborhood compatible housing. While the ADU ordinance has successfully increased the availability of lower cost small residential units within residential areas of the City, several guidelines within the ordinance may place unintended barriers on some property owners

[21] City of Santa Cruz Accessory Dwelling Unit Development Program web page.

who intend to construct such units. Off-street parking requirements, lot line building restrictions and unit size limitations that are not flexible on larger acreage properties limit the number and diversity of ADU projects within the City. Some have recommended that additional guidelines be developed that better address site specific opportunities would increase the number of ADU projects constructed, leading to additional lower cost housing within the community. The City has periodically modified ADU regulations to continue to encourage his type of housing infill. The current regulations represent a balance of neighborhood compatibility with ADU opportunities that the community agreed to when last considered. Modifications to the ADU guidelines will be considered periodically through the Planning Department.

Similarly, parking requirements both for residential and commercial development have been described as onerous and costly by some commentators on the CAP. Some have opined that the infill policies within the General Plan are hindered by parking allocations that may or may not be necessary for a particular type of development. The City is currently evaluating parking policies for both residential and commercial properties through a City-wide parking study.

City's Role in Regional and Local Transportation Planning

The City plays an active role in the numerous regional transportation planning and management efforts including the METRO Transit District and the Santa Cruz County Regional Transportation Commission. The City also sponsors many public advisory bodies such as the Transportation and Public Works Commission and the Bicycle/Pedestrian Subcommittee that help prioritize public investments in transportation programs. All of these collaborative entities are critical in the successful implementation of the CAP.

Community Reduction Measures

This Climate Action Plan identifies programs and actions that support the implementation of the General Plan 2030 and supports enhanced alternative transportation infrastructure projects that could enable residents to safely and conveniently move throughout the City by bike, foot, and various transit options. This CAP focuses primarily on local programs for local options. These local options are intended to help meet the City's transportation measures as outlined in Table 5.2, including our primary Climate Action Goal for the transportation sector: a 30% reduction in around town car trips.

Community Sector

1. Reduce within-town car trips by 10% by 2020.
2. Double bike ridership through the continued implementation of long term actions identified within the Bike Plan that complete a safe network of bike corridors with "Very High" and "High" priority projects completed by 2020.
3. Reduce trips by car to and from elementary and secondary schools by 30% by 2020.
4. Reduce regional workforce single occupancy vehicle commutes 10% by 2020.
5. Work with the METRO Transit District and others to increase local public transit ridership for multiple sectors of the community by more than 5% by 2020.
6. Provide incentives for the switch of 20% vehicles to low-carbon/high-efficiency alternatives by 2020.

Table 5.2 Community Transportation Measures

10% Reduction in Around Town Car Trips

To encourage residents to make more trips by bike and foot, better integration of infill development projects with the expansion of a "connected infrastructure for bicycles and pedestrian travel that will make bicycling and walking not only practical but also a safe and truly desirable choice"[22] is needed. Expansion of the multi-modal infrastructure along the transit corridors envisioned in the General Plan necessitates that capital projects be developed in concert with redevelopment planning. Accommodation of new, contiguous, and safe bicycle and pedestrian facilities and paths that link residential areas with commercial and employment centers can best be accomplished as a coordinated planning process among City departments (aka Sustainable Transportation and Land Use Planning).

Sustainability as a Primary Objective of Transportation Planning

To integrate the 10% SOV trip reduction goal into city planning processes, new transportation review

22 Master Transportation Study, 2000

and modeling approaches will need to be integrated into land use and transportation planning guidelines and procedures. For instance, multiple traffic models were used to better understand the effects of City infill policies outlined in the General Plan. The Sustainable Transportation and Land Use Team will promote sustainable transportation through actions that integrate forward-looking analyses of demographics, market preferences, and job location trends as outlined in the 2030 General Plan Update.

The 2004 National Transportation Research Board describes some of the next steps for integrated transportation planning.

Transportation planning should be proactive and promote sustainability through practices such as integrated land use and transportation planning and cross-modal planning. Transportation planning also should conduct forward-looking analyses of demographics, market preferences, and job location trends to be responsive to the emerging needs of future generations.

New transportation forecasting models are now available (i.e. STARS) that better predict future mode split projections based on higher density, multimodal infill policies. The City Sustainable Transportation and Land Use Team will be tasked with determining the best way to use these new transportation models when projecting future car and bicycle use associated with new development projects. These new modeling techniques will ensure that infill policies and investments in alternative transportation infrastructure, implemented to meet our 10% SOV reduction, are integrated into future land use and transportation projections.

Bicycle Environmental Quality Index (BEQI) Pilot Project–Lakeshore South

BEQI Street & Intersection Scores
0 - 20 Environment not suitable for bicycles
21 - 40 Poor bicycle conditions exist
41 - 60 Basic bicycle conditions exist
61 - 80 Reasonable bicycle conditions exist
81 - 100 Ideal bicycle conditions exist
Streets
Freeway
Parks

Figure 5.1 Bicycle Environmental Quality Index (City of San Francisco)

Similarly, the prioritization of future Santa Cruz Bicycle Plan projects should assume that infill policies and bike corridor improvements will lead to the projected doubling of bike ridership and that improvements should be made to those critical bicycle corridors to accommodate this increase in demand.

Bicycle and Pedestrian Project Prioritization

The 2008 Bike Plan defines more than 80 projects to improve bicycle corridors within the City. Because all bicycle corridors cannot be completed at once and a corridor is a more attractive alternative when the entire length provides a consistently high level of service, the Sustainable Transportation and Land Use Planning Team could work to prioritize implementation of the Bike Plan and MTS. Projects within the Bike Plan will be selected that create a network of corridors that meet the objectives of the General Plan 2030 and link residential areas with schools and commercial districts. Priority projects will eliminate gaps and bottlenecks in current bicycle and pedestrian systems and connect the City's major activity and employment centers. Once a priority corridor is complete and provides a defined level of service and safety (see EQI below), the City should see an increase in within-town bicycle and pedestrian trips in that area by more than 100%.

Environmental Quality Index for Bicycle Routes

The City has consistently worked towards development of safe, efficient and enjoyable bicycle routes throughout the community. New tools are being developed to better define what constitutes a safe and efficient set of bike routes. The Environmental Quality Index (EQI) for Bicycle Routes, developed by the City of San Francisco, is a tool to rank the quality of bike routes and identify key gaps that exist within the bike network. An EQI assessment of City bike routes will provide data characterizing current infrastructure that will enable the public and the City Transportation and Land Use Planning Team to prioritize projects to create high quality routes from residential areas to schools and to business districts. The EQI will also enable the City to track success and report periodically to the community on the combined value of projects implemented through the Capital Improve-

ment Project. An added benefit of the EQI is that the index can be used to collect data through collaborative partnerships with bicycle groups and University students.

Santa Cruz as a Scooter Town

Motorized scooters are an under-utilized transportation option in Santa Cruz. Scooters are a lower carbon alternative to the single occupancy vehicle, require less parking infrastructure, are fun and support a beach-oriented tourist economy. For those who work in the downtown business district, making a switch from a car to a scooter can also provide an economic benefit, as parking and gasoline costs can be difficult for some employees to absorb. The City currently provides free scooter and motorcycle parking in some parking garages and the Sustainable Transportation and Land Use Planning Team is best suited to identify additional scooter parking areas that will publicize and incentivize the use of scooters over cars for employees, residents and visitors.

School Pick-Up/Drop-Off Reductions

Thousands of daily within-town car trips are made to drop-off and pick-up children from school, causing significant congestion and GHG emissions. A study by Gateway School estimated that while more than 25% of students get to school by bike or foot, more than 85% also are frequently driven. Bay View Elementary found similar results. Numerous local community and parent groups continue to advocate for continued investment in "safe routes to school" programs and infrastructure. The city has been very successful in obtaining grants towards this end. Two student-oriented goals that the City will focus on are to:

1. Accommodate the safety needs of children attending local schools by continuing proactive planning and design decisions that actively support cycling and pedestrian access between neighborhoods and schools.
2. Continue to execute bikeway and pedestrian projects that complete, link or extend existing infrastructure to realize the above stated goal (at a EQI of Reasonable or better).

Regional Workforce Commute

In addition to within-town car trips, the MTS and other studies and plans have identified other travel sectors (e.g. daily county-wide work commute) that currently rely primarily on single passenger car trips that can be targeted for reductions. A large number of commute-time drivers travel into or out of Santa Cruz daily with trips too long for biking to be an option. A 2007 survey estimated that as many as 10,000 Santa Cruz residents travel over the Santa Cruz Mountains to work in the Silicon Valley each day. Recent AMBAG survey results indicate that many Santa Cruz residents also commute to Monterey County daily. Many of these commuters travel by Single Occupancy Vehicle (SOV) because that choice is the most rapid, efficient, and cost-effective alternative. The appointed City leaders who participate on the boards of the METRO Transit District, the Santa Cruz County Regional Transportation Commission, and the AMBAG Regional Blueprinting process must continue to advocate for new alternatives to the SOV for regional work commutes, in order to meet state GHG reduction goals.

Santa Cruz METRO Transit District

The Santa Cruz METRO is a transit district serving most of Santa Cruz County. The METRO Transit District works in partnership with the Santa Cruz County Regional Transportation Commission, AMBAG, and UC Santa Cruz as well as the County and local municipalities to support regional transportation planning and enhance county ridership. The METRO Transit District bus system has one of the highest ridership rates in the State largely attributed to the successful collaboration with the University. Through that collaboration, transit programs that are paid for with student fees to provide fast and efficient bus service from key points within the community to the core of the campus.

Continued collaboration between the City, the University, the SCCRTC, the METRO Transit District, and AMBAG is needed to encourage greater use of the transit system by other sectors of the community currently unlikely to use the bus. Specifically, the program needs to further explore options to attract new riders from portions of the community that travel between cities for work and for those who travel between residential areas and commercial and industrial areas. To attract new portions of the population to use the bus, many municipalities have initiated public planning processes with the goal of providing service to new sectors of the community. Communities

23 Boulder website: www.bouldercolorado.gov

like Manly, Australia and Boulder, Colorado have achieved just this objective.

"Boulder boasts seven high-frequency bus lines with catchy, character-verb names like: STAMPEDE, DASH, BOUND, and BOLT, with all of the buses having their own color scheme and identity. It all started back in 1989 when Boulder endeavored to provide a real alternative to the car for its downtown commuters and as a result gave residents direct input into the process. In addition to creating comfy, frequent, pleasant buses, the city also instituted the Eco Pass, a transit card that allows residents to ride buses system-wide for free - more than doubling transit use between 1995 and 2005, from 15% to 34%."[23]

State funding for METRO service has been repeatedly cut. These cuts affect only certain portions of the community; therefore the level of public outcry for returning state funding is not as great as with other cuts. If services can be defined that will increase ridership to levels near those in Boulder, the community would most likely be more vocal regarding budget cuts and more receptive to alternative ways to fund these services. While additional services cannot be provided without additional funding, one effort for the Sustainable Transportation and Land Use Planning Team and (if funding allows) a Transportation Planner will be to work with the METRO to investigate new service options that support infill policies and provide services for all sectors of the community.

Rail Corridor

The RTC is currently in the process of purchasing the 32-mile Santa Cruz branch rail line that runs from Davenport to Watsonville from Union Pacific. Escrow is anticipated to close by the end of 2011. The RTC has committed to providing passenger rail service on the rail line from Santa Cruz to Four Mile Beach and possibly expanding to Davenport while continuing to provide freight rail service.

Additionally, the RTC will conduct a Master Plan for the development of the Monterey Bay Sanctuary Scenic Trail network. This multi-use bicycle and pedestrian trail network may include significant segments of the rail corridor and will ultimately link with other networks to provide continuous bicycle and pedestrian access from the San Mateo/Santa Cruz County line to Pacific Grove in Monterey County. The project's ultimate goal is to tie into the California Coastal Trail initiative which aims to develop a contiguous multi-use trail along the entire coast of California from border to border. It is uncertain if Rail or Bus Rapid Transit will be evaluated as options within this plan. Once completed, the Master Plan will be adopted by the RTC and member agencies and become the guiding document for use in the construction and maintenance of the trail network.

The rail corridor provides the most significant new alternative transportation infrastructure opportunity within the City and County. The General Plan 2030 recognizes the value of the rail corridor and has policies and objectives within the Land Use section to support its development and use as part of the City's transportation system. Policies encourage the preparation of a Rail Transit Land Use Plan and the expansion of existing neighborhood facilities within easy walking distance of areas well-served by transit. While some have stated that Santa Cruz County does not have the population to support a commuter rail line and there is opposition from neighborhood groups, the City has continued to support and advocate for the rail corridor to become a cost-effective, viable transportation alternative to Highway 1 for north/south travel.

Current City plans and project prioritization processes do not fully recognize the opportunities provided by the new rail corridor, so once the General Plan 2030 is adopted, rail corridor planning and implementation will need to be integrated into these City plans and processes including the Transportation Impact Fee project selection process and the annual selection of projects within the Capital Improvement Plan. The CAP defines key City staff and actions that support a more integrated evaluation of how a rail corridor can be viable in combination with other transportation modes including METRO Transit District, bikes, car loan programs (ZipCar), local beach shuttles, and personal rapid transit.

Other Municipalities' Alternative Transportation Planning Efforts

The City is looking to other municipalities for models to guide our own transportation planning efforts. One example is the City of Monterey, which has initiated a citywide Multi-Modal Transportation and Parking Plan that requires future transportation systems to be multi-modal and not focused specifically on the au-

24 Monterey Citywide Transportation & Parking Study
25 Sonoma-Marin Area Rail Transit District Webpage www.sonomamarintrain.org

tomobile. The Plan addresses all of the City's main transportation corridors, ensuring that commercial areas are accessible to pedestrians and bicyclists as well as motorists and are well served by public transit. The plan also ensures that parking price and location is appropriately managed. The planning effort will be implemented through the three mixed-use specific plans and the Waterfront Master Plan currently under development.[24]

The Sonoma-Marin Area Rail Transit District (SMART) has begun to build a 70-mile passenger railroad and adjacent bicycle-pedestrian path along the publicly-owned Northwestern Pacific Railroad right of way through the two counties. The rail line runs from Cloverdale, at the north end of Sonoma County, to Larkspur, where the Golden Gate Ferry connects Marin County with San Francisco. Along the way SMART will have stations at the major population and job centers of the North Bay: San Rafael, Novato, Petaluma, Cotati, Rohnert Park, Santa Rosa, Windsor, and Healdsburg.[25]

The SMART train and pathway project will provide the backbone of a transportation system that ties existing transit systems such as buses and ferries along with future options such as shuttles and trolleys into a seamless network that creates true transportation options for North Bay residents. Without that backbone, a congested Highway 101 will remain the only viable alternative for north-south travel in the two counties. The SMART project is estimated to cost about $690 million, the bulk of which will come from Measure Q, a one-quarter percent sales tax increase approved by 69.6 percent of Marin and Sonoma voters in the November 2008 election.

Both of these communities have demonstrated the value of regional planning that focuses on multiple transportation modes and linkage among the various options to reach destination points.

Alternative Fuel Vehicles

State incentives for people to replace aging vehicles with more efficient hybrids or plug-in hybrids are essential if the State and City are to meet their transportation reduction goals. Such technology could reduce emissions by 50% over current vehicles and may provide a significant opportunity to increase fuel efficiency and reduce greenhouse gas emissions. While local residents have purchased a large number of hybrid (the total number is being investigated) and fuel-efficient cars, the reduction of an additional 52,300 tons of CO_2 by 2020 will be difficult to achieve without additional incentives to support this change.

Most cities are not able to provide cash rebates to support the purchase of electric and alternative fuel vehicles but can provide other incentives that can be an economic and time saving opportunity. Programs that provide free electric charging and free or preferred parking benefit electric vehicle owners and increase the functionality of these vehicles within our community. The City of Santa Cruz is working with the Monterey Bay Electric Vehicle Alliance (the regional EV planning group) to establish a systematic strategy to increase the number of plug-in electric vehicles in the Monterey Bay area through increasing the availability of recharging stations and evaluating opportunity areas to install new recharging facilities or for partners to provide other incentives that increase the utility of EV.

Fleet vehicles provide an excellent opportunity to invest in alternative vehicles and help educate the community regarding their utility. Currently, the University has a large number of electric vehicles (EV), the City of Watsonville has purchased several, and the City of Santa Cruz uses electric carts on the municipal wharf, for parking meter maintenance and is evaluating other opportunities to use EVs within portions of our fleet.

Tracking and Reporting

The Sustainable Transportation and Land Use Planning Team and (if funding allows) a Transportation Planner will be responsible for annual reporting on the successful implementation of measures to meet the CAP Chapter 5 Goals. Additional data will need to be collected to fully evaluate Chapter 5 success. Specific metrics include:

- Bi-annual bike ridership on priority corridors
- Number of hybrid and alternative fuel vehicles
- Project completion status along priority bicycle corridors
- Initial Environmental Quality Index of priority bicycle corridors
- Improvements in EQI on priority bicycle corridors
- METRO ridership within the City
- Public EV charging station use
- General Plan 2030 implementation

Chapter 5. SUSTAINABLE TRANSPORTATION AND LAND USE PLANNING

MUNICIPAL SECTOR

Measures	Description of Costs	Estimated Cost $	Key Departments & Staff	Emissions Reductions (tons)
1. Reduce City fleet vehicle emissions by 20% by 2020.	Many of these activities will be integrated within the current department level and fleet pool costs. The City has approved a policy to pay a 15% premium for hybrid and electric vehicles.	Large but Anticipated Cost Effort	Fleet & Facilities Operations, Energy Mgmt Office, Transportation Coordinator & Finance	**530**
2. Establish a Sustainable Transportation and Land Use Team among the Public Works, Planning, and Economic Development and Redevelopment Departments.	Costs will be minimal to support current staff participation on the Team.	Small Cost Effort	Transportation Planner, Planning, RDA, Public Works	**NA**
3. Support implementation of the General Plan infill policies.	Cost will be for current future planning staff and the creation of a new Sustainable Transportation Planner position. ($120,000 annually)	Medium Cost Effort	Planning, Public Works	**Integrated elsewhere**
4. Actively participate in the county and regional transportation planning working groups.	Cost defined within objective 3.	Small Cost Effort	Planning	**Integrated elsewhere**

COMMUNITY SECTOR

1. Reduce within-town car trips by 10% by 2020.	Costs beyond current staff include possible loss in parking revenue to provide free parking incentives for low-carbon alternatives, additional support for local tranprotation education programs, and additional coordination with public groups and commissions.	Small Cost Effort	Energy Management Office, Public Works, Planning, Green Business	**19,091**
2. Double bike ridership through the continued implementation of long term actions identified within the Bike Plan that complete a safe network of bike corridors by 2020.	Estimated costs within 2008 Bike Plan for High and Very High projects is $6,300,000. The City has been successful in getting grants for several of the most expensive projects and two thirds of the projects are for less than $40,000. Many lower cost projects require changes in local street parking to provide room for new bicycle lanes.	Large but Anticipated Cost Effort = $6,000,000	Transportation Coordinator, Public Works, Planning & RDA	**9,546**
3. Reduce trips by car to and from elementary and secondary schools by 30% by 2020.	Costs will be minimal to support current City Environmental/Sustainability Programs and staff (Green Business Program & Safe Routes to School)	Small Cost Effort	Transportation Coordinator, Planning & Climate Action Program	**2,864**
4. Reduce regional workforce single occupancy vehicle commutes 10% by 2020.	Cost defined within objective 3.	Medium Cost Effort	Green Business, RDA	**6,831**
5. Work with the METRO Transit District and others, to increase local public transit ridership for multiple sectors of the community by more than 5% by 2020.	Cost defined within objective 3.	Medium Cost Effort	Planning, Public Works	**777**
6. Provide incentives for the switch of 20% vehicles to low-carbon/high-efficiency alternatives by 2020.	Cost include current Transportation Coordinator and those defined within objective 3.	Small Cost Effort	Transportation Coordinator, Public Works, Planning & Climate Action Program	**1,412**

6 WATER CONSERVATION AND SOLID WASTE MANAGEMENT

WATER DISTRIBUTION AND CONSERVATION

Water is a precious natural resource that is vital to our health and welfare and to the economy of the Central Coast community where we live. The City of Santa Cruz owns and operates its own Municipal Water District. The District provides water to the entire City of Santa Cruz, the University of California, adjoining unincorporated areas of Santa Cruz County, part of the City of Capitola, and coastal agricultural lands north of the City.

The Santa Cruz water system is comprised of four main production elements: 1) the North Coast sources, 2) the San Lorenzo River, 3) Loch Lomond Reservoir, and 4) the Live Oak Wells. The North Coast sources consist of surface diversions from three coastal streams and a natural spring located approximately six to eight miles northwest of downtown Santa Cruz. These sources are Liddell Spring, Laguna Creek, Reggiardo Creek, and Majors Creek. The use of these sources by the City dates back as far as 1890.

The City's water system relies entirely on rainfall, surface runoff, and groundwater infiltration occurring within watersheds located in Santa Cruz County. No water is purchased from State or Federal sources or imported to the region from outside the Santa Cruz area. Because of this, annual variability in rainfall patterns greatly influences the amount of water available for immediate use. Rainfall in Santa Cruz averages 30.7 inches annually, but varies considerably (Figure 6.1) and can lead to years of drought that require the community to respond rapidly through conservation and use restrictions.

Goal for this Chapter

- **Continue to reduce per capita and total water use within the Santa Cruz service area.**

Energy Use Requirements of a Water District

Providing water to residents and businesses requires a significant amount of energy. The State of California estimates that 20% of State electricity use is for the treatment and distribution of potable water.[26] Because Santa Cruz relies on locally obtained surface water and has invested in energy efficient equipment to treat and distribute water, the energy content of each acre foot of water supplied (kWh/acre foot) is below most northern California districts (Figure 6.2). The ten year average energy use by the City is 1,803 kWh for every million gallons of treated water production. Since water production (as well as wastewater treatment) is dependent on public use and weather con-

26 Cohen, Nelson, and Wolff, 2004

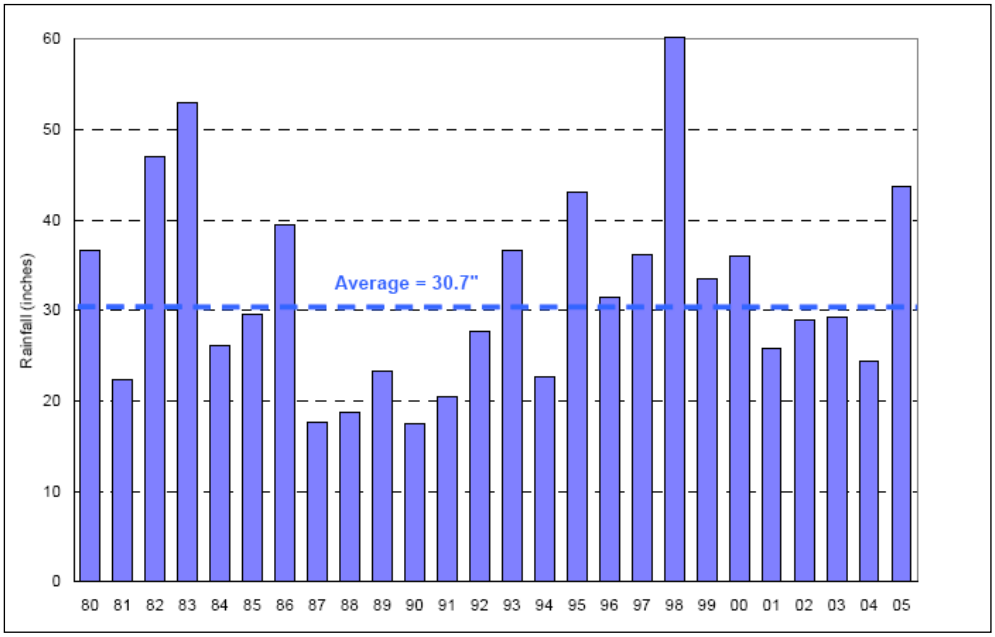


Figure 6.1 Santa Cruz Annual Rainfall

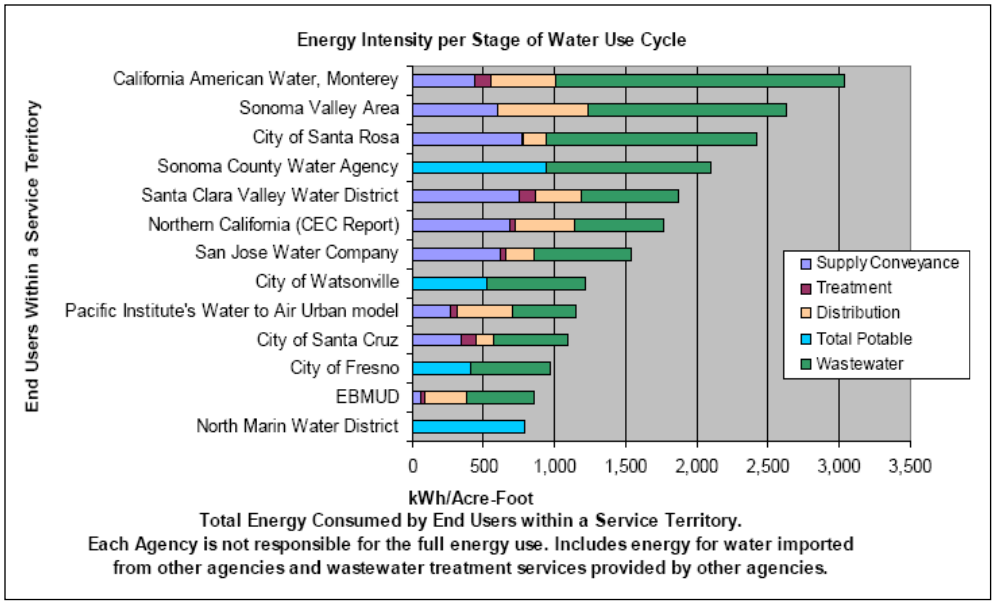

Energy Intensity per Stage of Water Use Cycle
End Users Within a Service Territory
California American Water, Monterey
Sonoma Valley Area
City of Santa Rosa
Sonoma County Water Agency
Santa Clara Valley Water District
Northern California (CEC Report)
San Jose Water Company
City of Watsonville
Pacific Institute's Water to Air Urban model
City of Santa Cruz
City of Fresno
EBMUD
North Marin Water District
Supply Conveyance
Treatment
Distribution
Total Potable
Wastewater
0 500 1,000 1,500 2,000 2,500 3,000 3,500
kWh/Acre-Foot
Total Energy Consumed by End Users within a Service Territory.
Each Agency is not responsible for the full energy use. Includes energy for water imported
from other agencies and wastewater treatment services provided by other agencies.

Figure 6.2 Total energy use per acre-foot for 13 northern California districts

ditions, the Water Department will continue to look for efficiency measures that reduce energy costs and could lead to future reductions in energy used per million gallons produced.

Integrated Water Management Strategies

In 1997, the City of Santa Cruz began implementing an "Integrated Water Planning" approach to determine how to best supply our customers with drinking water. This approach combines water conservation, use curtailment during droughts, and development of modest additional supplies of water. The City adopted an Integrated Water Plan (IWP) that was written with the purpose of responding to current drought-related crises and planning for future growth. As stated in the IWP, the City will: 1) reduce near-term drought year shortages; and 2) provide a reliable supply that meets long-term needs while ensuring protection of public health and safety.

Water Conservation

The City has a long-standing commitment to water conservation (see Table 6.1) and currently offers a variety of programs, informational materials, and financial incentives to help City water customers become more water-efficient.

2002	**Community Service–Resource Efficiency Award** from the California Municipal Utilities Association for our High Efficiency Clothes Washer Program
2004	**Energy Efficiency Award** from Flex Your Power Campaign
2008	**Community Service–Resource Efficiency Award** from the California Municipal Utilities Association for our Plumbing Fixture Retrofit Program
2008	**Excellence Award for Local/Community Innovations** from the California Urban Water Conservation Council

Table 6.1 City of Santa Cruz State Awards for Water Conservation Programs

In 2000, the City adopted a Water Conservation Plan, the goal of which was to reduce water demand system-wide by 282 million gallons per year by 2010. Through plumbing fixture and appliance rebate programs, technical assistance, regulations, and other strategies, residential and commercial customers were successful in reducing water use by 250 million gallons per year by 2010, and by another 300 million gallons per year since 2005 due to changes in water rates and rate structure changes. The City's Water Conservation Plan will be updated to define strategies to further reduce per capita water use by 2020. Figure 6.3 below shows our annual water usage (1985-2010) broken down by community sector and illustrates the successful reduction in water consumption achieved over the last 10 years.

Additionally, the City is a member of the California Urban Water Conservation Council (CUWCC) and has committed to implementing all 14 Best Management Practices outlined within the Memorandum of Understanding.

Incorporating the content of the City's Water Conservation Plan and the CUWCC's Best Management Practices, the 2005 Urban Water Management Plan outlines the four main areas where the City will continue focusing to achieve our water conservation goals and reduce our GHG emissions. The areas are as follows (taken directly from the IWP):

1. **Public Awareness and Education:** promote public awareness and education about the City's water resources and the importance of water conservation; and provide timely and accurate information to utility customers about conservation practices and technologies, as well as the City's conservation programs and policies.
2. **Water Demand Monitoring Program:** monitor water production, consumption and system water losses; track weather and population data; evaluate trends in per capita water use; track demand associated with new service connections; compare actual water demand with projected use by customer category; and analyze the need for increased conservation activities in response to changes in categorical water use or system losses.
3. **Long-Term Water Conservation Programs:** develop and implement various conservation projects and programs that result in a sustained reduction in customer water demand; track water savings from on-going conservation programs; and evaluate the need for program modifications to improve efficiency, customer service, and water savings in keeping with conservation goals.
4. **Planning and Emergency Management:** develop and maintain water demand forecasts for the water service area for use in supply planning; coordinate conservation activities into an overall Integrated Water Plan; analyze impacts of water shortages and demand hardening in order to minimize hardship to utility customers; update the drought shortage contingency plan for use in future water shortage events; plan for and respond to water shortage emergencies due to disaster or other unforeseen circumstances; and periodically update the City's Urban Water Management Plan.

Additionally, State law continues to evolve that informs the City's conservation efforts. The latest influential pieces of legislation are Assembly Bill 1881 and Senate Bill 7.

Water Use Curtailment

When water supplies are insufficient to meet existing customer demand, water use must be curtailed. When water is in short supply, these curtailments typically occur during the May-October "peak season", which is the time of year when rainfall is lowest and demands

are highest. The expected peak-season shortage under worst historical hydrologic conditions (i.e. those that occurred in 1977) is a key benchmark that is used to measure system reliability. Currently, the worst-year peak-season curtailment is expected to be about 43%.

An important strategy of the Integrated Water Plan is to accept the fact that there will be water shortage events from time to time that will have to be managed by the City with programs that temporarily reduce water use, as opposed to trying to eliminate future water shortages by developing enough supply capacity to overcome the drought of record. This strategy minimizes the cost and environmental impacts of developing a large supply capacity.

A key issue in the IWP planning process then becomes how much and how often the community is willing and able to tolerate cutbacks in water use during future water shortages, and what degree of hardship corresponding with different degrees of water shortages constitutes an acceptable risk. The City's IWP assumes the community will cutback water use 15% in dry years when water is in short supply.

In March 2009, the City adopted an updated Water Shortage Contingency Plan that set forth an overall strategy to prepare for and respond to future water shortages. Then, after a third consecutive year of below normal rainfall and runoff, it became necessary to put the contingency plan into immediate effect. The City declared a Stage 2 water shortage and set a goal to cutback peak season water use by 15%, or 300 million gallons, to safeguard water storage in case of a subsequent dry year.

Under the contingency plan, an overall water cutback of 15% is attained by reducing outdoor use by about one third and by reducing indoor domestic and business use by five percent during the peak season months. Accordingly, customer demand reduction measures in 2009 included mandatory restrictions of outdoor water use. Three primary restrictions limited irrigation by:

- controlling the number of watering days (two assigned days per week),
- regulating the time of day customers were allowed to water (before 10:00 a.m. or after 5:00 p.m.), and
- imposing irrigation time limits (up to 15 minutes per station for spray heads).

In many ways, the effort to reduce customer water use during 2009 was considered a success. Consumption reduction goals were achieved. The overwhelming majority of the City's customers complied with water restrictions. Reservoir storage was preserved. Little if any, lasting damage to public and private landscapes was done. Accordingly, the water shortage of 2009 was important not only as an enactment of the newly created Water Shortage Contingency Plan, but also as a test of a core idea underpinning the City's Integrated Water Plan, namely that the community could achieve and would tolerate periodic cutbacks in water use by up to 15 percent.

Proposed scwd2 Regional Seawater Desalination Project

The third strategy of the IWP to address water supply shortfall is to develop additional water supplies. A new supplemental water supply, combined with conservation and acceptable levels of curtailment, is needed to bridge the gap between existing supplies and current and future demands. The water supply component of the IWP is the culmination of a long series of supply alternative studies engaged by the City since 1985.

The Santa Cruz Water Department (SCWD) and the Soquel Creek Water District (SqCWD) have determined that current surface and groundwater resources are limited and threatened. Exhaustive studies by both agencies identified desalination as the most favorable option for delivering a flexible and reliable water supply. As a result, both agencies joined efforts, forming **scwd2,** to study the feasibility of desalination as a supplemental source of water to meet our communities' needs. The treatment facility would be capable of providing up to 2.5 million gallons per day (mgd) of water as a supplemental water supply. This water would help SqCWD meet its annual water needs as it reduces groundwater withdrawals of the over-drafted Soquel-Aptos area to prevent seawater intrusion. The desalination facility would also help SCWD meet the water needs of its service area during drought periods or other water supply shortages.

scwd² is currently moving forward with the timeline outlined in Table 6.2. The environmental review process, as required by the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA), is being conducted for the proposed desalination facility.

The desalination plant will be located within the City of Santa Cruz and, without implementation of energy minimization and carbon mitigation,

April 2010	Final Report of SWRO Desalination Pilot Plant Project
2010-2013	Environmental Review (including numerous environmental and engineering studies)
2010- 2015	Desalination Facility Design
2015-2017	Desalination Facility Construction
2017	Operation

Table 6.2 Key Steps and Proposed Schedule for the Desalination Plant

could potentially increase the City's carbon footprint by an estimated 2,000 tons of CO2e/year. Running at full capacity year-round, the plant would have a peak demand of 1.6 MW and require about 13,700 MWh of energy annually. In a typical, non-drought year, the facility is expected to run at half capacity and thereby require approximately 0.8 MW or about 6,800 MWh annually. Although located within City limits, the desalination plant will benefit both agencies and therefore the energy use and resulting GHG's related to the operation of the plant will be attributed to each agency independently based on their respective annual usage.

scwd² is committed to thoroughly studying the energy use and resulting GHG's of the Desalination Program. In support of the environmental review process, **scwd²** is conducting an Energy Minimization and Greenhouse Gas Reduction Study (Energy Study) to select renewable energy and GHG mitigation projects to offset some or all of the City's GHGs associated with the project. Under the guidance of a dual agency Desalination Task Force, with assistance from a Technical Working Group (TWG) comprised of water, energy and policy experts, projects will be selected taking into account local benefit, technical maturity and reliability, operational impacts, amount of energy produced/saved or GHG emissions reduced and environmental and community impacts. The offset goal, (i.e. the level to which the project is offset) chosen by each agency's governing board, will integrate into the goals established by the CAP as well as meet local and State requirements as applicable. The TWG was formed to create an inclusive and robust process for development of the Energy Study. Drawing upon many informed voices including the City's CAP Coordinator, the Energy Study will ensure collaborative opportunities to invest in efficiency and large scale projects to meet city-wide goals to the extent feasible. The top ranking portfolio of project alternatives could then form the elements of the Energy Study and, upon implementation, offset the indirect greenhouse gas emissions associated with the plant once operational.

An appendix to the Energy Study will be an implementation plan for the mitigation project portfolio selected by each agency. This plan will go into detail about installation timeline and potential environmental impacts associated with development of the mitigation projects. The plan will outline the procedure for conducting an environmental review of each project. This comprehensive review process will be subsequent to the Desalination Program Environmental Impact Report (EIR) and approval of the project.

Consistent with all existing and future municipal energy uses, the City will be responsible for tracking and reporting the energy used and GHG emissions produced directly or indirectly at the plant per the City CAP annually. Direct GHG emissions could come from the construction of the plant or from fleet vehicles serving the plant. Indirect emissions could come from electricity usage off of the PG&E power grid. This reporting process lends to transparency and allows for each agency to assess the effectiveness of the mitigation project portfolio on an annual basis, giving rise to opportunities to change and improve projects as needed.

The Water Department recognizes that adding a supplemental supply, like desalination, has the potential to increase the energy required to produce drinking water. The intent of the Energy Study is to minimize the increased energy associated with desalination and take further measures to reduce the GHGs emissions associated with the supplemental supply to net zero levels.

Water Conservation and Distribution Measures

Given the fact that the City runs and operates its own Municipal water system, it has numerous opportunities to invest in conservation incentive programs but also has the responsibility to ensure a safe and reliable water supply for businesses and residents within its water service area. The CAP, therefore, focuses on unique partnerships and new program opportunities

to support and enhance the current efforts being implemented by the City Water Department. Figure 6.3 and Table 6.3 show our annual water usage over time broken down by community sector and help give us our priority focus areas.

Customer Class	Number of Accounts	Annual Usage (million gallons)	Percent of Total Usage
Single Residential	18,862	1,184.5	41
Multi-Residential	2,726	690.7	24
Business	1,885	527.3	18
Industrial	50	227.3	8
Municipal	224	48.5	2
Irrigation	444	95.8	3
Golf Irrigation	6	77.7	3
Coast Irrigation	34	20.9	1
Other	120	2.0	–
Total	24,351	2,874.7	100

Table 6.3 Water use by sector of the community 2010.

Community Reduction Measures

Municipal Sector

1. Implement an updated City Water Conservation Plan to maximize water use efficiency.
2. Increase or establish use of rainwater catchment and reclaimed/grey water, where appropriate.

Residential Sector

1. Support implementation of Water Conservation Plan to maximize water use efficiency.

Commercial Sector

1. Support implementation of Water Conservation Plan to maximize water use efficiency.

Table 6.4 Water Conservation and Distribution Objectives

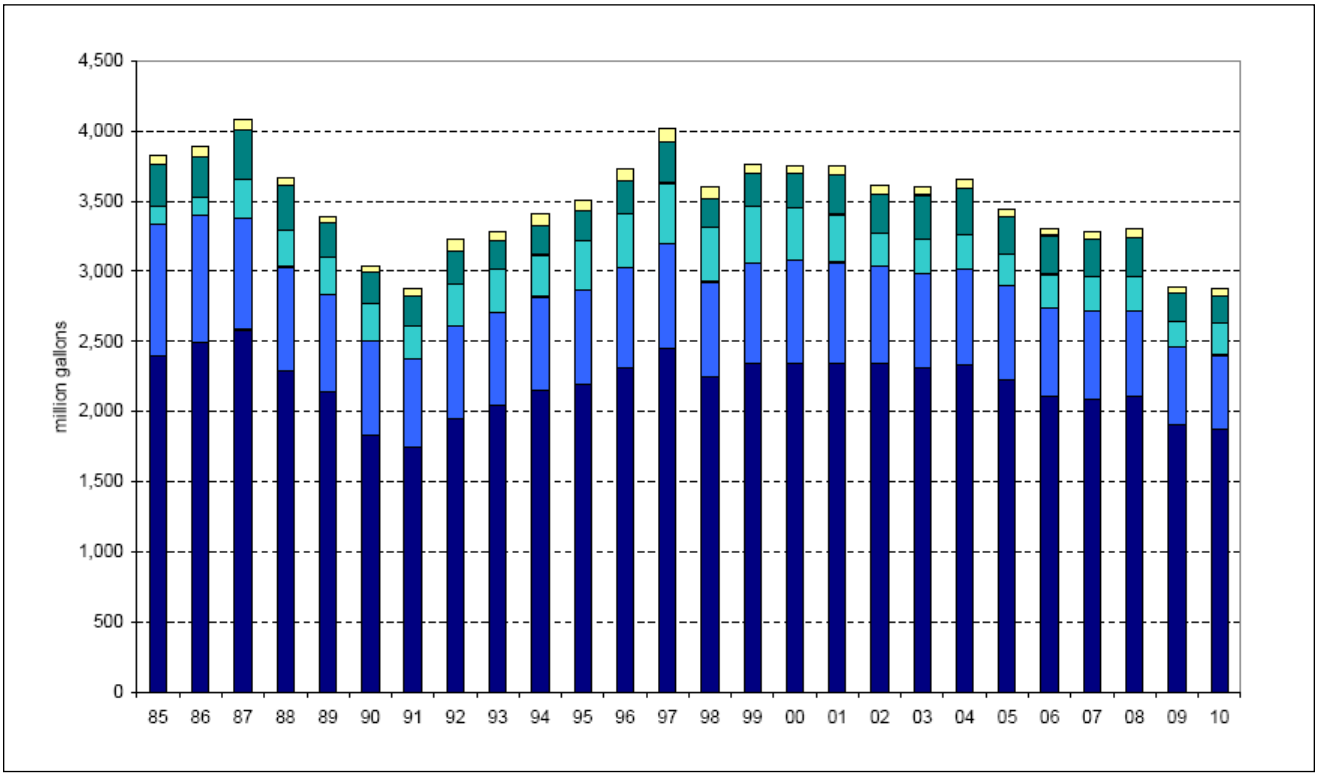


Figure 6.3 25 years of Metered water consumption, by customer category (million gallons). Note that water use in 2010 is below 1985 levels.

Partnerships

Many conservation incentive programs provide rebates for home retrofits of plumbing fixtures and appliances but there are few incentives for landlords who do not pay water bills to participate. The City will partner with Central Coast Energy Services, Inc. (CCES) to incorporate a Water Demand Reduction Program to their Home Energy Assistance Program, much the way the City of Watsonville has done. CCES is a not-for-profit organization that provides energy conservation, consumer education and advocacy, home improvement, utility assistance, and job training to low-income renters and homeowners in Monterey, San Benito, and Santa Cruz counties. Eligible applicants qualify for energy efficiency-improving measures to be done in their homes to reduce energy costs.

The Water Demand Reduction Program replaces older high water use toilets and showerheads with low-flow replacements free of charge through the City's Water Conservation Department. CCES will install the toilets as part of their comprehensive energy efficiency improvement service package sponsored by the federal and State governments. Additionally, the City Water Department and Waste Water Treatment Facility continue to investigate and prioritize energy efficient upgrades to further reduce energy use per volume of water provided and used.

> If one out of every 100 American homes was retrofitted with water-efficient fixtures, we could save about 100 million kilowatt-hours of electricity per year—avoiding 80,000 tons of greenhouse gas emissions. (EPA, 2008)

Water Reuse and Rainwater Capture

Water reuse and rainwater capture provide low carbon sources of water for residents and businesses. Gray water options are now readily and legally available for homes. They range from installing a dual drainpipe to capture washing machine, shower/tub, or bathroom sink water for outdoor irrigation to placing a bucket in the shower to capture water for in-house toilet flushing reuse. For businesses and subdivisions, some municipalities including Scotts Valley have added ordinance language that requires some types of new development to install two water mains; one supplying water to irrigation and other uses where non-potable water sources can be utilized. Such requirements provide cost effective opportunity for future installation of recycled water pipes to areas with a ready to serve set of buildings and infrastructure.

Rainwater catchment options including cisterns and bio-swales in the landscape to collect water for irrigation use. These simple methods can enable water customers to cut water use costs of their more expensive rate tiers. There are numerous programs and services within the community that offer interested homeowners the education and/or expertise necessary to put these measures in place as well as redesign their gardens and landscaping for lower water needs. The CAP has focused on supporting and collaborating with these efforts to provide them to those interested in saving and reusing water.

Future Growth and Water

The City is completing an update to its General Plan. The General Plan update outlines the numerous policies currently being implemented by the Water Department aimed at continuing to reduce per capita water use necessary to meet State and local water use reduction goals and accommodate the growth outlined in the Draft 2030 General Plan. In addition, the Water Department is updating its Water Conservation Plan for 2010 and continues to implement the BMPs outlined by the California Urban Water Conservation Council. In addition, the Water Department is updating its Water Conservation Plan for 2010 and continues to implement the BMPs outlined by the CUWCC. The Plan will identify possible water-saving technologies, programs, and services that will reduce future water demand, and identify remaining long term water conservation potential across the service area, to fashion a similar water conservation plan for the City for the next ten-year period. The Plan will provide a long range road map for the future, and will further water efficiency efforts. The results will be used to help inform the City's water demand projections and will be factored into overall water supply planning efforts.

The University is planning for an increase in students, faculty, and academic facilities to meet the projected higher education needs of California's population over the next 15 years. The University's proposed Long Range Development Plan calls for an increase in student enrollment of graduate and undergraduate students to a maximum of 19,500 by 2020. The building program and a land use plan to support

the increased enrollment would increase the current amount of academic and support space and housing, and would lead to increased water use on campus. The University continues to make significant investments in water use reduction programs, with notable results. Moreover, the University has committed to payments to the City for its increased water use and those payments will be used by the City to finance water conservation projects throughout the City water service area in amounts that will at least equal any amount of increased campus water use.

Tracking and Reporting

The Water Department will be responsible for annual reporting on the successful implementation of measures to meet the CAP Chapter 6 water goals.

SOLID WASTE MANAGEMENT

Landfills are designed and constructed to prevent the leaching of contaminants into the surrounding water, air, soil, and habitat. This leads to waste decomposition in an environment largely devoid of oxygen. When organic matter such as food, yard waste, and paper products decompose without oxygen, methane (CH_4) is produced instead of carbon dioxide (CO_2). As mentioned in previous chapters, methane is a greenhouse gas that is 21 times more effective at trapping heat in the atmosphere than carbon dioxide. Methane and other gas emissions come from the anaerobic decomposition of organic matter that stays in the landfill for decades.

At the City's Dimeo Lane landfill, a gas capture system has been implemented that prevents over 75% of the methane rich gas from entering the atmosphere. Once the gas is captured, it is burned to generate electricity, which is then sold to the Sacramento Municipal Utility District. This generation of electricity has the dual benefit of reducing the emissions of greenhouse gases by converting the methane into carbon dioxide, and also generating 11.5 million kWh of electricity annually.

Recycling one aluminum can save enough energy to run a 100-watt bulb for 20 hours, a computer for 3 hours, or a TV for 2 hours. (EPA, 2008)

While it is important to capture as much methane as possible from the landfill, the most effective strategy to reduce landfill GHG emissions is to reduce the amount of organic material going into the landfill. In fact, recycling and waste reduction within Santa Cruz has led to our greatest GHG reductions thus far. Unavoidable methane emissions from the landfill have been reduced by 62% due to reductions in disposal tonnage. For decades, the City has been initiating and maintaining waste reduction and recycling programs and services. The City has an award winning[27] and continually growing set of waste reduction programs that serve our community:

- Comprehensive curbside recycling
- Comprehensive drop-off recycling
- Curbside green waste collection
- Home composting rebate program
- Household hazardous waste recycling program
- Fluorescent light, battery, and medications recycling programs
- Appliance and electronics recycling programs
- School recycling and education program
- Environmentally Acceptable Food Packaging Ordinance that requires all food providers within the City of Santa Cruz to use biodegradable, compostable or recyclable products for disposable food service ware.
- "One Person's Trash" quarterly newsletter

The significant reduction in the amount of waste going into our landfill is due to residents, businesses, and institutions doing their part by actively participating in the programs above, as well as taking other actions such as reusing materials, reducing packaging waste, and composting at home.

Goal for this Section

- **Reduce GHG emissions through improved waste handling and increased recycling, composting, reuse, and waste reduction.**

Zero Waste

In 2000, the City passed a resolution adopting Zero Waste as a goal. Here is an excerpt from that resolution:

"The City of Santa Cruz … adopts Zero Waste as a long-term goal in order to eliminate waste and pollution

27 2008 Outstanding Recycling Program of the Year Award from the California Resource Recovery Association

in the manufacture, use, storage, and recycling of materials. This goal can be achieved through action plans and measures that significantly reduce waste and pollution. These measures will include encouraging residents, businesses and agencies to use, reuse, and recycle materials judiciously, in addition to encouraging manufacturers to produce and market less toxic and more durable, repairable, reusable, recycled, and recyclable products."

Solid Waste Reduction Measures

While the City has taken great strides toward achieving the Zero Waste Goal and our waste collection system is highly effective and state of the art, there is still more to be done and the Climate Action Plan outlines additional steps for the City to achieve the Zero Waste goal by 2030.

Waste Characterization Study

The City recently completed a waste characterization study of our landfill, a process by which the composition of the City's waste stream was analyzed to determine what is being thrown away (Figure 6.4). Results indicate that organic matter is a prominent type of material being thrown away (24%). Since organic matter is the biggest contributor of GHG emissions from a landfill and can be composted into a valuable soil amendment, the City will be working to create programs and services that significantly reduce the amount of organic waste going into our landfill. Some food and organic material could also be collected and digested in a controlled anaerobic environment to generate fuel for electricity generation or vehicle use.

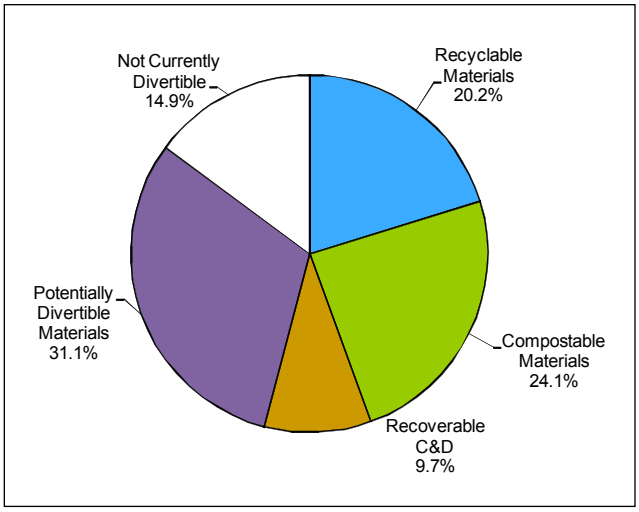


Figure 6.4 2010 Community Waste Characterization

Municipal Sector

1. Continue to implement programs to become a zero waste City by 2030.
2. Establish additional programs and services to support resource conservation and waste reduction as a daily action for all City staff.
3. Reduce emissions from waste collection and fugitive sources 10% by 2020.

Residential Sector

1. Reduce the amount of recyclable and compostable materials in the residential waste stream.

Commercial Sector

1. Reduce the amount of recyclable and compostable materials in the commercial waste stream.

Table 6.5 Solid Waste Management Objectives

Municipal Efforts

To help City staff improve their waste management at work, the Climate Action Plan recommends that the City conduct a waste audit for all City buildings and operations. A waste audit identifies what types and volumes of materials are being thrown away, recycled, reused, and composted, and makes recommendations for infrastructure and actions that would result in user-friendly systems that reduce garbage and conserve natural resources. Results of an audit will help staff appreciate how their actions can lead to significant cumulative GHG emissions.

Additionally, it is recommended that City Council approve purchasing policies created by the Purchasing Division that advocate for packaging reductions and reduced GHG emissions in the manufacture and distribution of products purchased by the City.

Tracking and Reporting

The Public Works Department will be responsible for annual reporting on the successful implementation of measures to meet the CAP Chapter 6 waste reduction goals.

Chapter 6. WATER CONSERVATION AND SOLID WASTE MANAGEMENT

MUNICIPAL SECTOR

Measures	Description of Costs	Estimated $	Key Departments & Staff	Emissions Reductions (tons)
1. Implement an updated City Water Conservation Plan to maximize water use efficiency.	Costs will be for current Water Department staff and program resources to implement this project.	Medium Cost Effort	Water Department, Water Conservation, Energy Mgmt. Office,	**148**
2. Increase or establish use of rainwater catchment and reclaimed/grey water, where appropriate.	Costs will be in time allocated to current staff to investigate and scope out new projects.	Small Cost Effort	Green Building, Water Conservation	**37**
3. Continue to implement programs to become a zero waste City by 2030.	Costs will be in time allocated to current staff to investigate and scope out new projects.	Small Cost Effort	Public Works	**6,271**
4. Establish programs and services to support resource conservation and waste reduction as a daily action for all City staff.	Costs will be in time allocated to current staff to investigate and scope out new projects.	Small Cost Effort	Green Business, Energy Mgmt. Office, Public Works, Finance, Planning	
5. Reduce emissions from waste collection and fugitive sources by 10% by 2020.	Costs are to scope and implement projects and purchase of new equiptment.	Large but Anticipated Cost Effort	Public Works	**922**

RESIDENTIAL SECTOR

1. Support implementation of Water Conservation Plan to maximize water use efficiency.	Costs will be for current Water Department staff and program resources to implement this project.	Medium Cost Effort	Water Conservation, Parks and Rec & Climate Action Program	**in M1**
2. Reduce the amount of recyclable and compostable materials in the residential waste stream.	Costs will be for current Water Department staff and program resources to implement this project.	Medium Cost Effort	City Waste Diversion	**in M3**

COMMERCIAL SECTOR

1. Support implementation of Water Conservation Plan to maximize water use efficiency.	Costs will be for current Water Department staff and program resources to implement this project.	Medium Cost Effort	Water Conservation, Green Business & Planning	**in M1**
2. Reduce the amount of recyclable and compostable materials in the commercial waste stream.	Costs will be for current Water Department staff and program resources to implement this project.	Medium Cost Effort	Public Works, Climate Action & Green Business	**in M3**

7 SOLAR SANTA CRUZ

Based on the results of the City's GHG Emissions Inventories and estimates of the reduction potential of the actions included in this CAP, it is apparent that conservation efforts alone will not be sufficient to meet our 2020 and 2050 emissions reduction objectives. We will also need to switch from fossil fuel-based energy sources to renewable energy sources. For a number of reasons (see "The Case for Solar"), solar energy is the primary renewable energy strategy the City will use in the near future. Investing in local solar energy generation is not only essential for us to meet our GHG reduction goals, but it also provides long term energy savings, creates a financial buffer against energy cost spikes, supports the local renewable energy industry, and can lead to innovation in renewable energy technologies.

While City staff is currently evaluating additional ways to invest in municipal renewable energy systems, the City must also play an important role in supporting residential property owners and businesses to make the switch to locally generated solar energy. The Solar Santa Cruz Program (this chapter) intends to develop tools and implement actions through the use of current municipal resources and through leveraging State and federal subsidies and grant opportunities. The City will work to minimize the following key hurdles to investing in solar energy systems:

The Case for Solar

Some have argued that wind and waves provide more cost-effective energy generation options to solar. Solar thermal and photovoltaic technologies, however, are proven, require limited permit and environmental review, and are available now. The climate in Santa Cruz is ideal for solar energy generation. Throughout the City there are thousands of residential and business roofs ideally situated for solar. While solar energy systems require a large initial investment, the operation and maintenance are minimal, so long term costs to manage a system are few. Until other options (wind, tides, geothermal) have been studied, designed, planned, and have received the necessary environmental scrutiny, the primary renewable energy strategy to meet the 2020 GHG reduction goals in Santa Cruz is solar.

- High upfront installation costs and a long payback timeframe
- Financing with high or variable interest rates
- Uncertainty associated with a 20-to-30 year investment with no guaranteed return on investment at time of sale

3.2 kW
5600 kwh/yr

Cumulative Savings With Solar	Year
($431)	1
($825)	2
($1,181)	3
($1,495)	4
($1,767)	5
($1,993)	6
($2,171)	7
($2,298)	8
($2,372)	9
($2,390)	10
($2,349)	11
($2,245)	12
($2,076)	13
($1,838)	14
($1,527)	15
($3,239)	16
($2,770)	17
($2,217)	18
($1,574)	19
$569	20
$3,047	21
$5,674	22
$8,459	23
$11,411	24
$14,539	25
$17,856	26
$21,371	27
$25,098	28
$29,048	29
$33,235	30
$33,235	Total

Figure 7.1 Solar Costs with Financing

The Economics of Solar

While at first glance, the initial upfront costs of a solar electric system may seem exorbitant, with help from State and Federal subsidies and tax incentives, residential and commercial solar is in many cases a sound investment. The adjacent chart calculates the cumulative savings and short term costs of making a loan payment at 8.5% to pay for a 3.2 kW solar system ($16,000 cost after rebates) once the associated electricity bill savings are factored in. As shown, the maximum cumulative out of pocket costs (loan payments minus electric bill savings) of this solar PV system for energy efficient homes using 5,600 kWh/yr is only $3,239 and the homeowner begins to save money annually after 20 years, saving $33,000 over thirty years. For a home that uses more electricity, the owner begins to save money almost immediately.

An upfront $16,000 investment for solar can be a significant hurdle. The City is working with the State and others to provide unique financing programs like Property Assessed Clean Energy (PACE) that enable homeowners to spread that investment cost over 20 years, leading (for many) to similar or lower monthly payments than would otherwise be paid to the electric utility.

Goal for this Chapter

- **Ensure a sustainable transition toward locally-generated renewable energy through programs, policies, and investments.**

Municipal Solar Energy Projects

Between solar generation on municipal buildings and methane capture at the Wastewater Treatment Facility, the City produces 5,400,000 kWh/year or 19% of its total electricity use from renewable sources. The municipality currently generates 188,000 kWh/yr or approximately 5% of its total electricity use from solar PV systems on City-owned buildings. See Table 7.1 below for a complete list of our renewable energy projects. This investment in solar PV saves the City $20,000 a year in energy costs and eliminates 50 tons of CO_2e annually.

Location	System Size	2008 Output (kWh)	Annual Savings
City Hall Annex	14 kW	19,677	$2,558
Wastewater Treatment Facility	51 kW	48,500	$6,305
Water Department, 212 Locust St.	75 kW	43,003	$5,590
Graham Hill Water Treatment Plant	128 kW	96,000	$14,186
Corporation Yard	55 kW	52,304	$6,800

Table 7.1 Municipal Solar Energy Projects

Municipal Renewable Energy Measures

There are many solar project options that remain for municipal installation. The City will develop and periodically update a Renewable Energy Plan as part of the Energy Efficiency and Conservation Strategy to coordinate departmental investment in renewable energy to reach a 33% locally generated renewable energy portfolio by 2020. In addition, the City will work with other regional municipalities in an effort to find more cost effective ways to invest in solar PV and thermal projects to reduce the municipal and regional GHG footprint.

Municipal Renewable Energy Project #1: Prioritization of Solar for Municipal Building

In 2010, the Energy Management Office completed an initial survey to identify buildings that would most benefit from installing Solar PV and Solar Hot Water infrastructure. Many buildings and City properties have been identified as potential sites for solar installations. Several of these sites have been selected for installation and are discussed below. Other locations require further analysis to determine which projects

Municipal Sector

1. Develop a Renewable Energy Plan as part of the Energy Efficiency Conservation Strategy to coordinate departmental investment in renewable energy to reach a 33% locally-generated renewable energy portfolio by 2020.
2. Partner with UCSC and other stakeholders to implement pilot projects that support development of emerging alternative energy technologies.

Table 7.2 Municipal Renewable Energy Objectives

provide the best energy savings and lowest costs. Many of these projects have been listed within the EECS for future implementation. Once the Energy Management Office is revitalized, these projects will be evaluated and prioritized for construction.

The City Water Department is also evaluating renewable energy project opportunities to discover local renewable energy projects to reduce department energy use and generate sufficient energy to offset a future desalination plant.

Municipal Renewable Energy Project #2: Renewable Energy Public/Private Agreement

In the past five years, the financial sector and renewable energy providers have developed innovative third party ownership financing structures (some called Power Purchase Agreements, PPAs). Since PPAs require significant legal, procurement, property management, and engineering expertise to execute and, therefore, have high transaction costs, they present a barrier to local governments. In an innovative attempt to reduce the transaction costs associated with PPAs and to support the proliferation of renewable energy generation, the members of the Joint Venture Climate Protection Task Force, lead by Santa Clara County, have suggested establishing a South Bay Area regional collaborative procurement. By leveraging the contractual resource investment of the lead agency and creating a procurement pool, each participating jurisdiction will benefit by significantly reducing the costs of developing the PPA, eliminating a barrier to adoption of renewable power by accelerating the financing process, promoting compliance with AB 32, and supporting local economic development.

The City is investigating other public/private partnerships with local businesses that may provide greater return on investment and reduced contractual obligations. Such partnerships may be able to utilize federal financing opportunities only available to municipalities while private partners may also benefit from other tax incentives. Currently, the City is working to identify large solar generation opportunities (1/2 to 5 MW) on municipal structures including parking garages, buildings and industrial areas. In May 2011, City Council directed staff to further investigate a PPA project for ½ MW of Solar PV.

Municipal Renewable Energy Project #3: Santa Cruz Coastal Energy Research Facility

The City of Santa Cruz Climate Action Program staff and the University of California, Santa Cruz (UCSC) have collaborated to develop a "Coastal Energy Research Facility (CERF)" located on the Municipal Wharf. The research facility focuses on mechanisms to scale up coastal energy generation to a capacity sufficient to provide significant power for municipal uses (50kW to 1MW). While many large scale systems are in development around the world that take advantage of optimal wind and wave resources, little research has been done to look at which renewable energy generation options might work in coastal communities with suboptimal geography and marine topography and still provide competitively priced energy to local markets. The Baskin School of Engineering at UCSC has established a new "Center for Sustainable Energy and Power Systems," (CenSEPS) which will focus on research with both renewable energy and traditional power generation systems.

The Santa Cruz Municipal Wharf provides a valuable coastal energy research opportunity. The

Figure 7.2 Municipal Wharf, location of the Coastal Energy Research Facility

wharf is an existing structure that provides accessible working space 2,000 feet out into the Monterey Bay. Many research projects can be accommodated on the current structure and permitting for other modifications should be less complex than for a new offshore structure. The wharf can provide public education opportunities regarding the current state-of-the-art renewable energy research being conducted by UCSC. Any energy generated from the CERF will be used on the wharf, with potential to make the wharf a zero net energy complex.

By partnering with researchers at UCSC and providing access to local ocean structures, the City hopes to develop a new research and development model focused on integrative approaches to harnessing local renewable energy resources in environmentally sensitive ways for local use. This collaborative project will enable scientists and policy makers to research the political, legal, and environmental issues associated with coastal energy generation through communication with regional water boards, the California Coastal Commission, and the Monterey Bay National Marine Sanctuary. Current State and local agencies have not yet established comprehensive policies regarding coastal energy generation. This initiative will integrate engineering and coastal scientists with decision-makers to create policy regarding appropriate ocean energy technology. Santa Cruz also looks to increase entrepreneurial opportunities for the renewable energy industry and research companies.

A demonstration and measurement platform has been constructed on the roof of the wharf headquarters for solar and wind power demonstration units (solar panels and a vertical axis wind turbine) as well as solar, wind, CO2 and other sensors. The final Coastal Development Permit was granted in May 2011 to allow for the summer installation of the climate sensor array and experimental wind turbine. The wind turbine will be left in place for one year. A remote camera system will monitor bird interactions to document and report bird strikes immediately to the research team and Wharf Manager. The turbine can be made stationary if problems with birds, noise or other issues arise.

City staff will continue to work with local and regional partners to define additional programs as needed to meet our local solar generation goals for homes and businesses.

Tracking and Reporting

The Municipal Energy Manager will be responsible for tracking and reporting the progress of renewable energy investments identified within the EECS and by individual City departments.

Community Solar Energy Projects

To date, the residents and businesses of Santa Cruz have installed over 540 solar electric systems on their homes and buildings, generating 3 Megawatts of electricity each year. The map to the right shows where these systems are located as of October 2011. In 2009, Santa Cruz residents installed 139 solar systems, more than any other medium-size city in northern California. In fact, in July 2010 the City of Santa Cruz was recognized by the Northern California Solar Energy Association (NorCal Solar) for being one of the top ranked Bay Area cities for newly installed solar PV technology and earned first place awards for the total number of PV systems installed and the number of PV systems installed per capita on residential, commercial, and municipal buildings in all 49 Bay Area medium-sized cities.

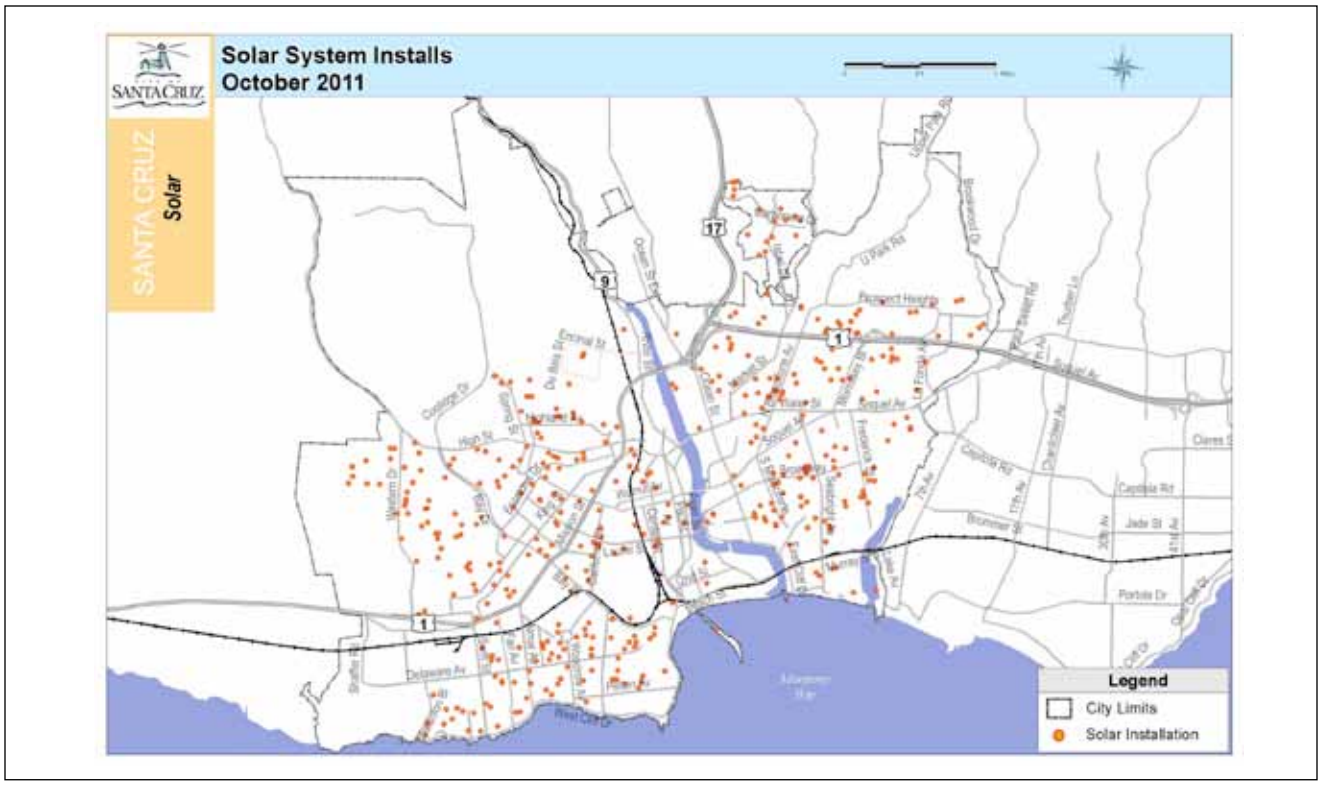


Figure 7.3 Residential Solar systems in Santa Cruz (2011)

Community Renewable Energy Measures

There continues to be strong interest in investing in solar energy generation in our community and the City is committed to supporting this movement. Key actions include:

Community Renewable Energy Measures

1. Implement the Solar Santa Cruz Program to increase the number of residential solar systems to 1000 by 2012 and 5000 by 2020. (~500 at present)
2. Work with the Green Building Program to install renewable energy on 60% of new buildings and remodels by 2020.
3. Implement the Solar Santa Cruz Program to increase the number of solar systems installed on businesses to 100 by 2012 and 500 by 2020.

Table 7.3 Community Renewable Energy Measures

Solar Santa Cruz Public Forum

Since the establishment of the Climate Action Program, City residents have contacted staff to voice their interest in increasing the amount of solar generated power in Santa Cruz. To further investigate the interest of residents and the hurdles that prevent them from installing solar, the City hosted a set of public workshops discussing how a City solar program could support an increase in locally generated solar energy. Table 7.4 outlines the results and consensus of opinion of the workshop participants.

Residential and Business Solar Programs

Through input from the solar forums and work with the solar industry, local residents and businesses, and our climate partners (County, UCSC and Ecology Action), the City's Climate Action Program has identified three priority renewable energy projects to be established by the City to eliminate hurdles and expand residential and business investment in renewable energy. These projects are described in detail below.

Solar Santa Cruz Program Objectives

Based on results of the 2008 Solar Workshop

- Programs should be cost effective
- Programs should support the local economy
- Programs that can be implemented soon should be an initial priority
- Programs should be easy for the customer
- Return on Investment (ROI) and monthly payments are critical considerations to home owners
- Programs should be available to those who rent

Through public input, the Santa Cruz Climate Action Program has set a goal of reaching 1000 solar homes and 100 solar businesses by 2013.

Table 7.4 Solar Santa Cruz Public Forum Summary

Community Renewable Energy Project #1: Pace Programs and Community Choice Aggregation (CCAS)

In 2008, The City of Berkeley and several other municipalities have created citywide voluntary Renewable Energy Assessment Districts where residential and commercial property owners can install solar systems on their buildings and pay for the cost of the systems as a 20-year assessment on their property tax bills. The passage of AB 811 in 2008 allowed similar assessment districts to be established by counties and other non-charter municipalities in California to provide financing for both renewable energy and energy efficiency projects. This enabled groups of municipalities to work together to provide this opportunity to large portions of the region.

In February 2010, the City of Santa Cruz and its partners (14 counties and 145 cities) were awarded a California Energy Commission State Energy Program grant to support the initial costs of a developing a Solar Finance District (PACE program).[28] Unfortunately, interference by the Federal Home Finance Administration has prevented states from enabling all of their homeowners to take advantage of PACE and the federal funds were redirected to strictly energy efficiency programs (see Energy Upgrade California).[29]

Recently a group of Congressional leaders introduced legislation that woul d restore local governments' ability to run property-assessed clean energy (PACE) programs. The bipartisan PACE Protection Act would again allow cities and counties to help property owners finance energy efficiency and renewable energy modifications for their homes and commercial buildings – without any government subsidies or taxes. The bill addresses the concerns of FHFA and facilitates participation by homeowners in every state with a PACE program, which will in turn promote conservation, energy savings, and job creation. The bipartisan PACE Protection Act would again allow cities and counties to help property owners finance energy efficiency and renewable energy modifications for their homes and commercial buildings – without any government subsidies or taxes. If this legislation passes, the City of Santa Cruz will work with other California municipalities and the CaliforniaFIRST program to reinitiate efforts to provide PACE to California residents and businesses.

Local Economic Benefits

California is a net importer of natural gas, meaning that much of the money spent in California for natural gas ends up outside the State. Investments in solar PV create jobs and retain wealth in California. Solar PV creates approximately two to three times as many construction jobs per megawatt of developed capacity as natural gas. There are approximately 500 solar PV related companies in California, including 70 manufacturers of solar panels and modules. Investing in solar PV will create a market for these home-grown businesses, as well as drive innovation and competition that will lead to lower cost systems.

Community Choice Aggregation:

In 2002 the State passed the California Community Choice Aggregation law (AB 117), enabling cities and counties to procure electricity and sell it competitively within their jurisdictions. In the spring of 2008, Marin county community members and business groups weighed in, providing overwhelming support for locally generated power and the development of local green business opportunities. Following six years of careful study and review in more than 200

28 More information available at www.californiafirst.org

29 More information available at www.energyupgradeca.org

public meetings and hearings, Marin it launched California's first Community Choice Aggregation (CCA) program on May 7, 2010. The program now supplies customers with clean, renewable energy at competitive rates.

City of Santa Cruz staff is working with other regional municipalities and special districts to investigate the feasibility of creating a similar CCA district within the Monterey Bay region. Such a district would help to eliminate several of the barriers that residents and businesses face if interested in using renewable electricity. Specifically, such a district enables businesses and residents to purchase electricity with a high percent generated from renewable sources without investing in their own solar panels. Obviously this provides a great value to those who rent their homes and business space. Large businesses with significant roof space could install solar and be assured that they would be compensated for any surplus energy generated from the system. Santa Cruz staff will continue to track and support efforts to evaluate the local potential for a CCA district.

Community Renewable Energy Project #2: Santa Cruz Solar Hot Water Program

Solar thermal hot water is a relatively inexpensive technology that can lead to significant GHG reductions from the heating of water for business and domestic use. The installation of a solar hot water system on a typical Santa Cruz home can reduce natural gas use by 30%. The cost of an average residential solar thermal system is approximately $4,000 - $6,000. For businesses, the upfront costs are typically higher, but for hot water intensive businesses the payback can be much quicker. Upfront costs are less than for a solar PV system and those costs can now be reduced with Federal and State rebates, yet costs and return on investment concerns continue to prevent the scale of investment in these systems seen in other countries and the State of Hawaii.

The City is exploring ways to establish incentive programs to help residents and businesses install solar hot water systems. One model in development is a low or zero interest loan program. The Santa Cruz Solar Hot Water Program would offer residents, rental properties, and small businesses the opportunity to reduce greenhouse gas emissions and energy use by providing interest free loans to install solar hot water systems. Participants would pay back the system cost over the course of five years through monthly charge on their City water bill. Homeowners in the program could save from $13 to $30 per month for the lifetime of the system by reducing their energy consumption. Savings for businesses that use significant quantities of hot water (coin-op laundry mats, motels, restaurants, and apartment complexes) could see significant monthly savings.

If the City is able to find support for this program, a pilot effort has been proposed to test its feasibility. A pilot On-Bill Financing for commercial solar thermal installations could be initiated for 20-40 small businesses. The current model would support the City or other partners/investors to establish a revolving fund to cover the out-of-pocket installation costs of a SHW system. Each loan of $5,000 - $15,000 would be paid off over the course of five years through an additional monthly charge on the business' Municipal utility bill.

The average Santa Cruz Business emits anywhere from 1-10 tons of CO2e per year to heat water; a pilot project's first forty businesses would avoid approximately 50-400 tons of CO2e every year for the life of the systems (as much as 12,000 tons of CO_2 over 30 years). If successful, the pilot program could be expanded and combined with a local offset investment program (see project #3) to increase the number of systems installed and greatly reduce GHG emissions from a large number of projects. Costs to the City would be for contract and billing services and any time of use costs for money provided to the fund.

Community Renewable Energy Project #3: Climate Change Reduction Fund

Recently, the Climate Action Compact agreed to partner with Monterey County associates to establish a regional GHG offset fund. The Monterey Bay Fund will enable residents and businesses to purchase certified carbon offsets from local renewable energy projects as well as fund non-certified projects that support energy efficiency and renewable energy projects that need local support to succeed. The establishment of a local offset fund could help stimulate investment in local energy efficiency, renewable energy, and other approved GHG-reducing projects by removing the upfront economic barriers. Such a fund could help those working toward a personal emissions reduction goal to invest in their community. City staff will pursue options with local partners to develop this pro-

gram and establish reporting procedures necessary to quantify the CO_2 reductions and costs of all selected projects.

In addition to certified Offsets the program is investigating the inclusion of a Climate Change Reduction Fund that would provide a mechanism by which individuals and businesses can contribute to local projects that don't require the expense of official offsets. This Climate Change Reduction Fund would provide privately donated funds to support energy efficiency and renewable projects in Schools and other charitable organizations that will lead to significant GHG emissions reductions.

For those businesses and residents that value offsets as a portion of their GHG reduction strategy (both certified and uncertified), this program would provide a local option to the national and international offset market.

Cumulative GHG (CO_2e) Reductions from Renewable Energy

- Through the implementation of the renewable energy PPA and Public/Private partnerships, the City could increase electricity generation capacity to 880,000 kWh per year or approximately 25% of our total municipal electricity needs (200 tons).
- For every 1,000 Santa Cruz homeowners and businesses which install solar PV systems by 2020, they would generate 3 million kWh/year or 3% of residential electricity use (680 tons CO_2e). This would cost $10 million to install and would save residents $17-20 million in electricity costs over 30 years.
- For every 1,000 homeowners and businesses which install solar thermal hot water projects, residents would save 125,000 therms or 2% of the total residential natural gas use (760 tons CO_2e). This would cost $4.5 million to install and would save residents $6.5 million over 30 years.

Tracking and Reporting

The Municipal Energy Manager, the Climate Action Program, and the Water Department will be responsible for tracking and reporting the progress of the renewable energy projects outlined above.

"A Climate Change Reduction Fund should not be seen as a mechanism to buy one's self out of personal or business responsibility, but rather as another tool to meet personal and community reduction goals."[30]

30 2009 City of Santa Cruz Staff memo to Santa Cruz Climate Action Committee partners working to develop a Climate Reduction Fund

Chapter 7. SOLAR SANTA CRUZ

MUNICIPAL SECTOR

Measures	Description of Costs	Estimated $	Key Departments & Staff	Emissions Reductions (tons)
1. Develop a Renewable Energy Plan as part of the Energy Efficiency Conservation Strategy to coordinate departmental investment in renewable energy to reach a 33% locally generated renewable energy portfolio by 2020.	Costs will be to create and implement an energy strategy, investigate new renewable energy opportunities and implement the projects through the EECS planning process.	Medium Cost Effort	Energy Mgmt. Office, Climate Action	**2,527**
2. Partner with UCSC and other stakeholders to implement pilot projects that support development of emerging alternative energy technologies.	Costs will be in time allocated to current staff to investigate and scope out new projects.	Small Cost Effort	Climate Action	**100**

RESIDENTIAL SECTOR

1. Implement the Solar Santa Cruz Program to increase the number of residential solar systems to 1000 by 2012 and 5000 by 2020. (Approximately 500 at present.)	Costs will be in time allocated to current staff to investigate and scope out new projects. Additional costs to implement new projects may occur.	Small-Medium Cost Effort	Climate Action, Water Department	**7,228**
2. Work with the Green Building Program to install renewable energy on 60% of new buildings and remodels by 2020.	Costs will be for current Green Building staff to implement this project.	Small Cost Effort	Green Building Program, Climate Action Program	**145**
3. Implement the Solar Santa Cruz Program to increase the number of solar systems installed on businesses to 100 by 2012 and 500 by 2020.	Costs will be in time allocated to current staff to investigate and scope out new projects.	Small-Medium Cost Effort	Climate Action, Water Department	**1,822**

8 SUSTAINABILITY THROUGH PUBLIC PARTNERSHIPS, EDUCATION & OUTREACH

Within the City of Santa Cruz, there are thousands of individuals, businesses, organizations, and institutions working on a diverse array of issues to make our community a model of environmental sustainability and economic vitality. The City itself has a long-standing record of initiating and implementing environmental programs that support sustainable practices and choices for local businesses, residents and visitors (see Table 8.1).

The current interest of the local community in the climate change crisis provides a unique opportunity to foster individual empowerment and partner for collective action. Climate change is a broadly encompassing issue that points to the urgent need for people to begin living within our ecological means. The mitigation of and adaptation to climate change will require each one of us to examine and make changes in our daily choices as well as look to each other for innovative solutions and support. Every one of us will be required to play our part because reliance on the State and Federal governments, new technology, and more energy efficient infrastructure alone will not be enough for Santa Cruz to meet our long term 2050 GHG reduction goals.

The primary goal of this chapter is to outline actions the City and its community partners may take to provide individuals with the information and opportunities needed to make everyday choices that reduce GHG emissions and contribute to environmental sustainability and economic vitality.

City Environmental Programs

- Water Conservations programs
- Watershed Protection and Management
- Sustainable Transportation Options
- Waste Reduction and Recycling Services
- Greenbelts and Open Space Preservation
- Stormwater Pollution Protection
- Urban Tree Programs
- Green Building Ordinance
- Sustainable Land Use Planning
- Green Business Program
- Community Gardens
- Bike Paths and Bridges
- City Creeks and Wetlands Plan

Table 8.1 City Environmental Programs

Goals for this Chapter

- **Identify and allocate funding and other resources for the implementation of the Climate Action Plan.**
- **Support community implementation of the Climate Action Plan through public education, outreach, and programs.**

City Council Challenge: Carbon Neutral Municipality by 2016

To ensure that the City has the resources to implement the CAP and meet its climate mitigation responsibilities, City Council members have proposed a strategy for the City to invest the necessary resources to implement the Climate Action Plan. Council members have challenged the City to meet an interim goal of reducing community wide emissions by an amount equivalent to the emissions produced through all municipal operations. The City of Santa Cruz emitted 10,222 Tons of CO2e in 2005 to provide services to the community, therefore the interim climate action goal is to reduce emissions by at least 10,222 Tons below 2005 levels by 2016, **making municipal operations essentially carbon neutral.** With this goal comes the need for dedicated resources to implement the CAP.

Municipal Sector

1. Establish a City Sustainability Team to coordinate ongoing implementation of the Climate Action Plan and ensure integration of actions with all City departments.
2. Develop an outreach campaign to highlight City's sustainability efforts to date and engage various constituencies in achieving our environmental goals.
3. Incorporate energy efficiency and resource conservation as daily actions for all City staff.
4. Support the establishment of sustainable purchasing procedures.
5. Continue leadership in the Climate Action Compact.

Table 8.2 Municipal Climate Action Objectives

City of Santa Cruz Sustainability Team

To increase the effectiveness of our environmental initiatives and programs, the City initiated the municipal Sustainability Team to coordinate environmental programs through among departments. The team will integrate and build upon existing programs and create a structure for the implementation and revision of the Climate Action Plan in collaboration with other City programs. The Sustainability Team will enable City staff from different departments to more effectively work together to identify new collaborative opportunities, resources, and funding sources to improve and expand City sustainability programs.

Formation of a City Sustainability Team, as modeled in other communities will ensure that the necessary resources are committed to the City's programs, initiatives, and services in several ways:

1. All environmental programs will be better coordinated among departments through the City Manager's Office.
2. Integrating the Climate Action Program within the Sustainability Team will establish a long-term structure for incorporating greenhouse gas reduction goals with all City services and policies.
3. Public outreach and partnerships will be better served through coordination of City environmental programs and services.
4. The City Planning and Community Development Department and the Economic Redevelopment Agency will have a greater ability to support sustainable land use planning through integration with other City departments and programs.
5. When possible, multiple environmental programs will be combined to make grant funding requests more competitive.

Currently, there is a City Climate Action Workgroup comprised of staff from various departments. This group was established by the City Manager's Office approximately three years ago and meets once a month to discuss and coordinate environmental efforts and programs. The members have provided guidance into the development, prioritization, and feasibility of the actions defined within the CAP. It is recommended that this workgroup transition into the City's Sustainability Team and that the long-term implementation of the CAP be managed by this Team with oversight from the City Manager's Office. City

Sustainability Team Next Steps

1. Determine how the Climate Action Plan can be supported and implemented by the Sustainability Team (i.e., funding, roles, responsibilities, and interdepartmental coordination)
2. Establish City lead (City Manager's Office).
3. Finalize short-term CAP roll-out priorities.
4. Establish annual CAP reporting process.
5. Complete City Climate Adaptation Plan.
6. Enhance City policies that support continued investment in low-carbon and sustainable products and services.

staff is working with the City Manager's office to establish the specific structure and roles of the Sustainability Team.

Once the Sustainability Team has been established within the City government, it will evolve and expand as necessary to support and collaborate on other possible sustainability projects such as:

1. Farmers markets
2. Community gardens
3. Agriculture education and incentive projects
4. Future collaborations and program development with regional partners
5. New collaborations with UC Santa Cruz

Resource Conservation through Sustainable Purchasing

The City spends approximately $85 million annually for the purchase of goods, services, and construction. All City purchases have the potential to impact our community environmentally, socially, and economically. To implement this portion of the CAP, the Purchasing Division will work to develop sustainable purchasing procedures that allow for the consideration of not only the cost of goods, services, and construction, but also the environmental and social impacts of these purchases.

The City has already incorporated environmental criteria into some of its purchasing. For example, the City currently purchases remanufactured toner cartridges and PCW recycled-content paper and requires use of eco-friendly chemicals and practices in our janitorial services contract. These efforts, however, have been driven by specific department projects rather than by a systematic, City-wide approach. Sustainable purchasing procedures established by the Finance Department would offer a more comprehensive solution.

Future sustainable purchase procedures should also promote other City programs and policies, such as the Monterey Bay Area Green Business Program and the Living Wage Ordinance. These procedures should be broad enough to apply to any purchase of a good, service, or construction and should allow for an ever-changing market. A final sustainable purchase procedure may include the ability to:

1. Consider and allow operational changes to justify increased costs,
2. Prioritize locally produced goods and services,
3. Use life-cycle costs to substantiate a higher initial price.

The Climate Action Compact

On September 26, 2007, the City of Santa Cruz, the County of Santa Cruz, and the University of California at Santa Cruz and other local businesses and non-governmental organizations signed an agreement signifying their intentions to lead the region's efforts to mitigate climate change. By signing the Climate Action Compact (CAC), these three partners made a clear statement that while the ramifications of and solutions to climate change exist at a global level, action towards those goals must start locally. In taking this leadership role, the partners of the CAC pledged themselves to the following:

1. Set greenhouse gas reduction goals for their organization;
2. Identify inter-institutional cooperative projects that reduce greenhouse gas emissions, stimulate investment in the community, and foster economic development;
3. Present a comprehensive emissions reduction action plan for their organization.

During the past three years, the CAC partners have each made progress toward accomplishing these goals (Table 8.3), demonstrating that with strong local leadership and cooperation, it is possible to make meaningful changes that protect our environment while benefiting the local economy.

In 2008, the CAC partners formed a committee comprised of dedicated staff representatives from

Climate Action Compact Successes 2007-2011

City of Santa Cruz:

- Completed Community-wide Greenhouse Gas Emissions Inventories for 1996, 2000, 2005 & 2008.
- Initiated several GHG reduction programs to help sectors of the community reduce GHG emissions.
- Included Emissions Reduction Goals in the update of the City's General Plan.
- Completed a Climate Action Plan (this document).

County of Santa Cruz:

- Has worked with ICLEI to complete a County Government GHG Emissions Inventory, to be completed soon.
- Has worked with AMBAG to complete a County Community GHG emissions inventory (complete in spring 2011).
- Has begun a Climate Action Plan process scheduled for completion in 2012.

University of California Santa Cruz:

- Completed a Campus Sustainability Assessment.
- Completed GHG emissions estimates for University functions.
- Set Emissions Reduction Goals.
- Completed draft Sustainability and Climate Action Plans.

Table 8.3 Climate Action Compact Success

each partner agency as well as several members from the newly formed County Commission on the Environment. This committee has developed cooperative projects and initiatives for consideration using criteria established by mutual consent.

Several of these projects and initiatives are now being implemented:

1. **The Electric Vehicle Plug-in Workgroup:** The workgroup aims to develop and implement a five-year plan for the efficient and effective adoption of plug-in electric and hybrid electric vehicles. This plan is intended to help reduce vehicle emission while enhancing economic development and job creation.
2. **The Green Building Taskforce:** The Green Building Taskforce is working to create consistent green building ordinances and corresponding sets of checklists in each of the five local jurisdictions (County of Santa Cruz, City of Santa Cruz, City of Scotts Valley, City of Capitola, and City of Watsonville.)
3. **Santa Cruz Solar Finance District (CaliforniaFIRST):** If federal legislation to reinstate PACE programs, a local solar finance district will allow property owners within participating regions to finance the installation of energy improvements on their homes or businesses and pay the amount back as a line item on their property tax bills.
4. **Coastal Energy Research Facility:** The City of Santa Cruz and the University of California, Santa Cruz (UCSC) have developed a "Coastal Energy Research Facility" (CERF) located on the Santa Cruz Municipal Wharf. The research facility focuses on finding feasible ways to scale up coastal energy generation to a capacity that will provide significant power for municipal uses (50kW to 1MW). UCSC students have begun initial evaluations of the renewable energy potential of the wharf, several grant proposals have been written, and UC researchers are planning new studies to determine which energy generation options might work for coastal communities like Santa Cruz. More detailed information on this project is in Chapter 7 of this CAP.

Community Participation in CAP Implementation

The Climate Action Plan outlines actions that can and should be taken by those within the community as well as by the City. Indeed, many of the actions identified in this plan are better accomplished by residents, businesses and community groups. To support this collaborative approach to CAP implementation and address requests by the public to have a more active public role, City staff and the City Mayor recommend that staff convene a Climate Action Technical Working Group.

The Climate Action Technical Working Group will be established to enable the community to take a leadership role in implementing the CAP and to foster the collaborative efforts needed to achieve the community's Climate Goals. The initial framework

Community Sector

1. Provide support for 20% of City residents to pledge and take action to reduce their emissions 30% by 2020.
2. Support continued investment in City greenspace, parks and other fun things!
3. Support and expand programs to enhance sustainable options for those living and working in, as well as visiting, Santa Cruz.
4. Continue to coordinate and promote sustainable choices within the business community.
5. Partner with schools and higher education institutions to promote sustainable choices and policies.

Table 8.4 Community Climate Action Objectives

for this Committee will involve participation by the Climate Action Coordinator, one representative member of City Council and up to 10 representatives from community organizations and public interest groups that participated in the drafting of the CAP. Members will be appointed by the Mayor based on need and interest.

The Climate Action Coordinator and Committee partners will host up to 6 meetings over the first year of CAP implementation and at least 4 times annually thereafter. Meetings will focus on strategies that the City and Community can take to improve implementation of the CAP. The Community Partnership Committee will also be asked to provide a report to City Commissions and the City Council as part of semi-annual reports on CAP implementation status.

Tracking and Reporting

The Climate Action Program will be responsible for tracking and reporting the progress of Sustainable projects developed by the City and the Climate Action Compact.

Community Sustainability Measures

Taking steps to significantly reduce greenhouse gas emissions requires coordinated effort and collaboration amongst many regional stakeholders. Since 96% of the community's GHG emissions come from sources not within the control of the municipality (homes, schools, private vehicles, and businesses), the CAP has identified avenues for building partnerships and leveraging funds to implement as many of the 256 actions currently identified in the Climate Action Plan as possible.

Residential Collaboration and Partnerships

It ultimately will be the citizens of Santa Cruz who determine whether we adequately address and respond to climate change. Through our individual actions at home, at work, within the community, and at the ballot box, we will either proactively support the transition to an efficient and low carbon economy or put this off until we are in crisis. This transition towards sustainability does not need to be one of sacrifice but one of conscious decision making and prioritizaion. Fortunately, there are many groups and organizations that are helping individuals make conservation-oriented decisions that best reflect their personal priorities. The City is committed to fostering this learning process and the gradual progress towards greater sustainability.

Santa Cruz Citizen's Climate Action Pledge

The Climate Action Pledge is a way for individual residents to acknowledge and participate in the City's greenhouse gas reduction goals. It is a powerful first step in joining a community-wide movement to be a part of the climate change solution **www.30x20.org.** The pledge states:

At first glance, a pledge to reduce emissions by 10% in one year may seem daunting. However, many

I pledge to be a part of the climate change solution by reducing my carbon dioxide emissions by 30% by 2020. To do this, I will:

1. Calculate my current carbon footprint and do my best to reduce my carbon dioxide emissions by at least 10% in the next year and 2% each year thereafter;
2. Do my best to become "carbon neutral" by switching to renewable energy sources and by offsetting the greenhouse gases I do emit;
3. Express my concern and commitment to my local governmental leaders;
4. Live a sustainable lifestyle;
5. Buy local and support green businesses in Santa Cruz.

resources are available for those who want support in successfully accomplishing their pledge goals and many members of the community have surpassed this goal while participating in the Climate Action Teams Program.

Climate Action Teams Program

The Climate Action Teams Program (CATP) was developed in spring 2008 and launched as a pilot program in June 2008. The purpose is to support and empower individuals to make specific changes in their daily lives that reduce their carbon emissions and meet their personal 30% reduction by 2020 pledge goals as well as to inspire personal responsibility, environmental and community stewardship, and the sharing of information amongst City residents. The program also serves as an avenue for two-way communication between the City and its residents to identify more sustainable options for how we live, work, shop and travel within Santa Cruz.

Climate Action Teams consist of small groups of people (i.e., friends, coworkers, neighbors, family, church members, classmates) who come together for four meetings over a six-week period to calculate their current carbon footprints, set personal emission reduction goals, tailor make and implement action plans to meet those goals, support and inspire one another, tally their personal reductions, and celebrate their cumulative reduction results. Teams are guided through the program by a team leader, who has already passed through the program, using a simple, straightforward and adaptable workbook called "Low Carbon Diet: A 30 Day Program to Lose 5000 Pounds" by David Gershon. Team members are informed of resources and services, such as the City's waste reduction and water conservation rebates, which provide assistance and cost-savings opportunities as they make changes to reduce their impact on the environment.

In its one-and-a-half year pilot phase, the Climate Action Teams Program proved to be a valuable outreach tool to engage and motivate community members to take ownership and responsibility for climate change action and advocacy. Ten teams and almost 70 people participated in the pilot program, cumulatively reducing their carbon dioxide emissions by 95 tons per year and pledging to reduce it by an additional 102 tons per year within the next six months to five years.

Successful expansion of the CATP relies on funding through grant opportunities or through the coordination with other cities, counties and the UCSC Sustainability Program. If funding is successfully established, the City Climate Action Program could expand upon the pilot program to reach 10% of the City's population with targeted outreach efforts to specific sectors of the community. The Climate Action staff will also work with its partners to investigate options for regional support and expansion of the CATP to other areas of the Monterey Bay.

Climate Action Teams for City Employees

Seven City employees participated in a Climate Action Team and numerous other City employees have voiced interest in participating on a team to better understand how their daily choices can lead to greenhouse gas emissions as well as how the program communicates to residents the various City programs run by their departments. Participation in the program empowers employees to explore how the information and ideas provided through participation in a Climate Action Team can be used to further reduce greenhouse gas emissions in City facilities and operations.

Climate Action Teams and the Monterey Bay Area Green Business Program

The Monterey Bay Area Green Business Program (GBP) has demonstrated that improving the efficiency of lighting and appliances can greatly reduce energy costs and GHG emissions. However, if employees fail to alter their behavior and habits, not all of the reduction potential will be achieved. The City is working with the GBP Regional Task Force to determine how the CATP could be offered to participating businesses. Employee CATs have been held at several businesses during the pilot program and the response has been positive. The City will continue to work with local businesses through the GBP and the Green Wave Campaign (see below) to fully investigate how to provide the CATP to interested businesses.

Green Space, Parks, Gardens, and Trees

Much of the CAP focuses on providing avenues that we can individually and collectively follow to reduce our use of resources, live more sustainably, and lower our GHG emissions. This can be perceived as requiring sacrifice and leading to a lower quality of life for

people. However, working together can actually increase the quality of life by creating more livable and people-friendly neighborhoods and business districts, building community and resiliency, protecting natural resources, increasing health and well-being, saving money, and enabling more people to work and shop locally.

An important part of this movement is to enhance the quality of the City's open spaces, parks, watershed lands, urban forests, and community gardens. In addition to continuing to support the farmer's markets by providing for sufficient space and infrastructure, the City will work to increase the number of community gardens as well as evaluate the potential for a residential excess harvest program that could integrate with food assistance programs and farmers markets. The City will continue to expand our urban forest and collaborate with community groups that are planting and caring for trees. Finally, the City will ensure that new development doesn't lead to a significant decline in vegetation and trees by incentivizing water-efficient landscapes and reduced use of asphalt in those areas.

Sustainable Choices within the Business Community

Currently, local business owners struggle to participate in available conservation oriented programs because of limited time and issues associated with tenant/landlord coordination. The actions below describe mechanisms the City may develop to provide businesses the one-on-one support they need to take advantage of available programs and services. The Sustainability Team staff will work with the Redevelopment Agency and business organizations to quantify, report and advertise the cumulative GHG and resource reduction actions taken within the commercial districts.

Monterey Bay Area Green Business Program

The Monterey Bay Area Green Business Program assists, recognizes and promotes businesses and government agencies that volunteer to operate in a more environmentally responsible way. To be certified "green," participants must be in compliance with all regulations and meet program standards for conserving resources, preventing pollution and minimizing waste. When a business has met the GBP standards, they are awarded a Green Business Certificate and door stickers, are recognized by the elected body, and

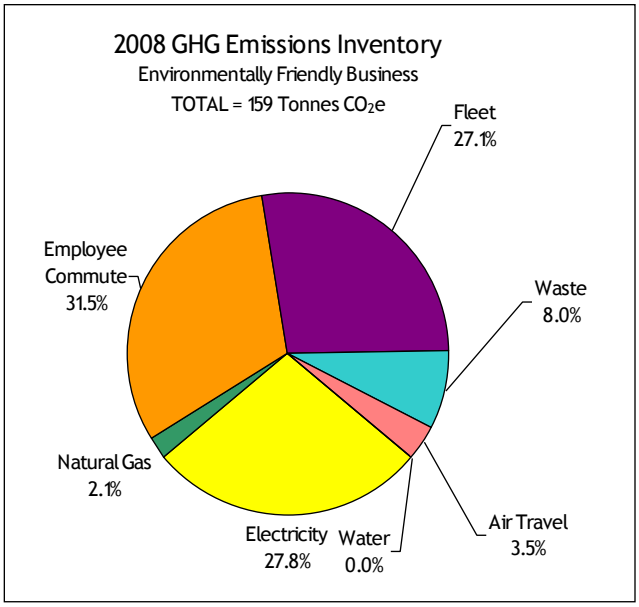


Figure 8.2 Example of local business GHG results by sector

are included on websites and in advertisements encouraging the public to patronize their Green Business. They must continue to meet the criteria and be reassessed every three years to maintain their certification. **www.montereybaygreenbusiness.org**

The GBP is a critical partner in providing many of the tools and infrastructure needed to work with local businesses to reduce their resource use and greenhouse gas emissions. The City Climate Action Program staff has developed and piloted, with help from the Santa Cruz Community Credit Union, a Climate Change Mitigation component for the GBP. The Green Business Program Task Force is currently working to incorporate the new component into the region-wide program. The Climate Change Mitigation component was designed to tie together many aspects of the GBP to enable businesses to measure their current greenhouse gas emissions, quantify the GHG reductions achieved through actions taken for GBP certification, and prioritize actions to significantly reduce future emissions.

Once fully incorporated, the Climate Change Mitigation component of the GBP will consist of the following support tools for participating businesses:

- a web-based greenhouse gas emissions calculator
- a simple mechanism for creating a business Climate Action Plan
- a social networking website to provide links to many relevant local resources as well as encourage peer to peer discussion regarding difficult topics

Example Greenhouse Gas Reduction Plan for a Business

Goals

			% reduction	GHG reductions
Waste	1	reduce solid waste volume	20	20% x 21% = 4%
	2	decrease recycle content in waste container	50	50% x 21% = 10%
Employee vmt	4	decrease average employee VMT	10	10% x 7% = 1%
	5	increase number of employees that use alternative transportation	10	10% x 7% = 1%
	6	increase average fuel economy of employee vehicles	0	
Fleet vmt	7	decrease average VMT of business fleet	15	15% x 24% = 3%
	8	increase average fuel economy of fleet vehicles	10	10% x 24% = 2%
Energy	9	reduce annual average kWhs used	20	20% x 22% = 2%
	10	reduce annual average therms used	25	25% x 22% = 3%
Water	11	reduce annual average water usage	20	20% x 4% = 1%
			Total	27%

GHG reductions are calculated as the percent reduction goal times the percent of the business footprint from that sector.

Table 8.5 Example GHG Reduction Plan Using GHG Inventory Results

(i.e., cost/benefit evaluation, secondary social, environmental and economic impacts of various actions)

For those companies interested in additional opportunities, the program will offer to establish a business-oriented Climate Action Team to engage employees in the GHG reduction discussions.

Figure 8.2 is an example of a 2008 GHG inventory for an average green business. Using this information, a business can prioritize additional resource conservation measures to further reduce emissions and costs (Table 8.5). Establishing a company Climate Action Plan and tracking its implementation provides businesses with a way to evaluate the costs and benefits of each action and report on their success as a Green Business.

The CAP staff will continue to investigate how to improve access to valuable resources to help interested Green Businesses establish and implement comprehensive Climate Action Plans.

Green Wave Campaign

The "Green Wave Campaign" (GWC) would coordinate and publically highlight the various activities that the City and local business districts are taking to help Santa Cruz become a sustainable community.

Green Wave Campaign

The GWC will coordinate and highlight to the public the various activities that the City and local businesses are taking to become a sustainable community. This campaign will be a key action of the business section of the Climate Action Plan.

The idea is to coordinate the various environmental and climate actions available to businesses within central business corridors, beginning with Pacific Avenue, and work with businesses to increase program participation in these activities. The cumulative effect will be creating a "low carbon shopping corridor" that provides energy savings to the tenants, a more attractive energy stable rental environment for the property owners and provides the city with a "first in the nation" program that can be highlighted to the media, and used to market the values of a green business corridor. Cumulative results of these actions can also demonstrate how small businesses can play a large role in GHG reduction efforts within our community.

The downtown business corridor is an excellent option for a pilot program. Based on the results of the pilot, the program could move to other City business districts such as the Municipal Wharf, the Soquel/Water business corridor, and the Mission Street business corridor.

Goals:

- Integrate and promote current environmental programs within the Santa Cruz Business Districts
- Brand Santa Cruz as a green business city and market the values to local and regional consumers.
- Increase the penetration of the Monterey Bay Area Green Business and energy efficiency rebate programs to 10% of eligible businesses (currently 2%).
- Work with downtown property owners to increase the investment in renewable energy.
- Highlight the business community's commitment to meeting the City's Climate Action Goals.

City School Partnership

Another partnership opportunity exists to address climate change through increased support of environmental programs within the City's elementary and secondary schools. During the 2008/2009 school year, the Santa Cruz City School District (SCCS) expressed interest to the Climate Action Program staff in "learning the ropes" of climate change mitigation in preparation for future State requirements. In the summer of 2009, the Climate Action Program began training SCCS staff on climate action accounting protocol including inventorying emissions, setting reduction goals, writing a plan to meet those goals, completing plan actions, and tracking reduction results. Significant progress was made over the summer while school was out of session on the first phase of the training. Once the schools complete their GHG inventory, Climate Action Program staff will assist in the development and implementation of their Climate Action Plan.

Tracking and Reporting

The Climate Action and Green Business Programs will be responsible for tracking and reporting the progress of community participation, Green Business certification, and municipal sustainability efforts annually to City Council.

Chapter 8. PUBLIC PARTNERSHIPS, EDUCATION & OUTREACH

MUNICIPAL SECTOR

Measures	Description of Costs	Estimated $	Key Departments & Staff	Emissions Reductions (tons)
1. Establish a City Sustainability Team to coordinate ongoing implementation of the Climate Action Plan and ensure integration of actions with all City departments.	Costs will be in time allocated to current staff to investigate and scope out new projects, report out on current activities and periodically evaluate the status of the CAP.	Small Cost Effort	Energy Mgmt. Office, Climate Action & Public Works	**100**
2. Develop an outreach campaign to highlight City's sustainability efforts to date and engage various constituencies in achieving our environmental goals.	Costs will be in time allocated to current staff to investigate and scope out new projects.	Small Cost Effort	Climate Action, City Manager's Office	**NA**
3. Incorporate energy efficiency and resource conservation as daily actions for all City staff.	Costs will be in time allocated to current staff to investigate and scope out new projects. Cost savings anticipated to be commensurate with time spent.	Small Cost Effort	Green Business, Energy Management Office, IT & Climate Action	**NA**
4. Support the establishment of sustainable purchasing procedures.	Costs will be in time allocated to current staff to investigate and scope out new projects.	Small Cost Effort	Finance	**TBD**
5. Continue leadership in the Climate Action Compact.	Costs will be in time allocated to current staff.	Small Cost Effort	City Managers Office, Energy Management Office, Climate Action	**Integrated in other objectives.**

COMMUNITY SECTOR

1. Provide support for 20% of City residents to pledge and take action to reduce their emissions 30% by 2020.	Costs will be to provide funding for the City's Residential Climate Program staff to manage outreach, website, coordinate public events, support the development and expansion of public programs regarding climate change (Climate Action Teams, Green Wharf, etc.)	Medium Cost Effort	Climate Action	**2,600**
2. Support continued investment in City greenspace, parks and other fun things!	Costs will be in time allocated to current staff.	Small Cost Effort	Planning, Public Works, Parks and Rec & Climate Action	**Integrated in other objectives.**
3. Support and expand programs to enhance sustainable options for those living and working in, as well as visiting, Santa Cruz.	Costs will be in time allocated to current staff to investigate and scope out new projects.	Small Cost Effort	Climate Action	**Integrated in other objectives.**
4. Continue to coordinate and promote sustainable choices within the business community.	Costs will be in time allocated to current staff to investigate and scope out new projects.	Small Cost Effort	Green Business, Climate Action, RDA	**Integrated in other objectives.**
5. Partner with schools and higher education institutions to promote sustainable choices and policies.	Costs will be in time allocated to current staff to investigate and scope out new projects.	Small Cost Effort	Climate Action, Green Business & Parks and Rec	**Reductions will be quantified in partner CAPs.**

9 CLIMATE ACTION PLAN IMPLEMENTATION

Moving Towards Success

The successful implementation of this CAP and the attainment of the goals and measures defined within require, above all else, action and collaboration within the community, specifically among City staff, City Council members, the business community, residents, students, and visitors. If anything, this plan only begins the process of building the partnerships needed to move from goals to quantifiable reductions. It also works to establish the infrastructure and programs needed to drive future decisions and action and instill the urgency needed to meet our 2050 goals. This CAP and the General Plan it supports lay out a trajectory towards energy and resource sustainability that will require support from all stakeholders and the commitment to aggressive reductions in GHG emissions from all sectors of the community. Setting this demonstrative temperament from the beginning is intended to guide actions, establish the necessary discourse, and encourage a collaborative setting that will continue to move Santa Cruz forward in a sustainable future.

What the CAP is Not

The Climate Action Plan is not a dictate intended to limit future development or economic growth within Santa Cruz. The CAP is not meant to stop any individual project (as prescribed by the General Plan 2030) from moving forward. The Climate Action Plan is a strategy for Santa Cruz to grow in a sustainable way that meets GHG reduction goals while continuing to allow for the public and private development and redevelopment that will keep Santa Cruz a vibrant and livable community. We have searched for opportunities to establish incentives and partnerships to meet our goals rather than institute new regulations that require compliance by our businesses and residents. Similarly, the CAP lays out a roadmap that is not intended to be a barrier to City department project implementation but rather a mechanism to prioritize and integrate multiple projects (some that increase carbon emissions and others that reduce emissions) in a collaborative manner that achieves all municipal goals and address all municipal responsibilities.

Facing Forward

Creating a new environmental program during the greatest economic decline in generations is difficult. The City Climate Action Plan is a set of goals, measures, and actions that make up a logical set of steps forward toward a low-carbon future. There are many hurdles the City and community will face as we implement this and other environmental programs. Economic downturns have limited the resources available

to the City and the partners available to implement these plans and programs. There are limited resources to fund the staff to take the defined actions and meet our goals. Fortunately, the City is not beginning Climate Action Program efforts with this plan, but is rather defining next steps in a long successful move towards a sustainable community. Funding is not certain for many of the actions defined within this plan. In many cases, the City will need to find the resources to implement priority actions, and will look to those programs that currently have funding, are fundable through grants, or that can be achieved through partnerships with other municipalities, universities, and non-government organizations to meet the plan goals. Uncertainty exists regarding how quickly we can successfully implement this plan, but staff has prioritized actions based on logical next steps that build off of currently funded and successful programs. As the local and state economies improve, it will be the responsibility of staff, department heads, City Council, and the public to work together to find ways to implement this plan and meet our reduction goals.

In many cases, the actions in this plan define ways to integrate low-carbon alternatives into current City expenditures. Santa Cruz, along with other local municipalities, remains committed to prioritizing sustainable infrastructure and programs that meet environmental goals and lead to long-term cost savings for the City. Through wise investment, the City has demonstrated the economic value of such priorities. Our energy efficiency upgrades save the City close to a million dollars a year in energy costs. Strategic implementation of the CAP and the General Plan will provide additional benefits that will enable the municipality and the community to weather future crises, both economic and climatic.

Strategies for CAP Implementation

- **Build off success** – The CAP focuses resources where possible on municipal and community programs and actions that have already been established and shown success.
- **Use other's ideas** – By working with other municipalities, we are able to reduce costs of program development by replicating successful efforts begun elsewhere.
- **Partner with others in the region** – Multiple cities within the San Francisco and Monterey Bay areas have begun GHG reduction efforts that provide unique partnership opportunities and benefit from efficiency of scale and expertise of partners.
- **Commit resources for a core set of City staff to implement the plan** – The CAP identifies a number of key staff that will be responsible for implementation. The Sustainability Team will be established to coordinate staff actions.
- **Ensure communication among responsible City departments** – The Sustainability Team, the Sustainable Transportation and Land Use Planning Team, and the Municipal Energy Management Office are being established to ensure that efforts are implemented successfully through interdepartmental communication, prioritization, and cost sharing.
- **Seek guidance and leadership from the City Manager's Office** – Many of the measures identified within the CAP are the shared responsibility of multiple departments, which necessitates the oversight and leadership of the City Manager's Office.
- **Establish necessary working groups tasked with implementing key actions** – Several new working groups have been identified to lead actions and evaluate results. The Sustainability Team will provide oversight to coordinate staff actions.

Prioritization of Efforts

Since the City and its partners cannot implement all of the CAP reduction measures and actions concurrently, each one has been prioritized for implementation during three time periods: short-term (2012-2014), medium-term (2014-2016), and long-term (2017-2020). After considering GHG reduction potential, City department priorities, public comment, costs, feasibility, and secondary benefits to the community, a set of short-term actions (as identified Appendix A) were selected for initial implementation. The short-term actions will help us to move quickly toward community-wide GHG reductions as well as enable us to establish the infrastructure needed to reach our longer term goals.

Measures and actions defined within the CAP were prioritized based on current and perceived future opportunities. None of these actions represent a final binding commitment but rather outline directions to travel to meet our objectives. In fact, the GHG milestones defined within the Table of Actions exceed the reductions necessary to meet the City goals by 24,000

tons (40%) allowing flexibility in the implementation of this plan and supporting the organic and ever changing nature of State and local GHG reduction efforts and opportunities. Through periodic reporting to City Council and the public, we will track success, evaluate current efforts and future opportunities and revisit city investments into CAP program efforts. If interim targets are missed, City staff and council will need to reevaluate priority actions and the amount of resources dedicated to those actions, resulting in a revised CAP that is based on future opportunities, partnerships and available resources.

Information regarding cost, department roles, key contact people, and next steps are compiled and reported within the CAP Chart of Actions for these measures. By design, the priority list of measures addresses emissions from each community sector and for each energy use sector. Other measures will be further defined over time as we learn from current efforts and as State and regional programs and regulations evolve. Funding opportunities and technical advances will help prioritize the selection of additional measures and action to implement.

There are currently a number of mechanisms the City uses to prioritize expenditures to implement programs. The City will work to integrate the objectives of the CAP into these processes including the creation of an annual Capital Improvement Project list and Energy Efficiency Conservation Strategy. These two documents outline the City's priority infrastructure and building efficiency actions for the next fiscal year. The Energy Management Office and the Sustainable Transportation and Land Use Planning Team will define the process for which projects that address CAP objectives are evaluated and prioritized base on costs and energy savings/GHG emissions reductions.

Staff Resources

Over the past three years, the City Climate Action Program has investigated numerous innovative mechanisms to achieve GHG reductions within all sectors of the community. Measures that support or leverage current programs (city, regional or partner) have been prioritized. New programs or activities are recommended where gaps or new opportunities exist. Many CAP actions will be integrated into efforts of current staff within City departments that build off of environmental programs such as the Green Building, Green Business, waste reduction, and water conservation programs that have demonstrated their success in reducing GHGs and conserving resources. Other municipal programs and services can be as effective in meeting CAP goals if they are expanded and additional resources are invested in those areas.

Through Federal stimulus funding (ARRA), the City hired a half-time Municipal Energy Management Office staff for one year. That staff was able to compile a status report on the energy efficiency of all municipal buildings. Funding for Energy Management Office staff to oversee the implementation of those projects is key to successful implementation of this plan. Similarly, a skilled Transportation Planner position would enable the Planning and Community Development and Public Works Departments to more effectively integrate the General Plan objectives with City and regional transportation projects. In total, the CAP has identified specific staff needs equivalent to four full-time employees to oversee full implementation and achievement of the sustainability goals of the Climate Action Program. Currently, the City supports or has until recently supported these positions on an interim basis. Only the Sustainable Transportation Planner is a newly established position.

Rank	Project	Cost	City Amt (FY 10)	Grant Amt Needed	Justification For	Justification Against	Annual Ops Savings	Op Cost/ UOM	Annual Ops Savings $
3	Downtown Streetlights	$ 100,000	$ 20,000	$ 80,000	Ok energy savings, improves downtown appearance and lighting, decreases maintenance costs	Fair paypack period. Per website survey, not seen as critical from public standpoint when compared to other projects.	71,832	$ 0.160	$ 11,493
4	Fire Station 3 PV Solar Project	$ 90,000	$ -	$ 90,000	Fair energy savings. Design will be complete in 5/2009; adds 10 KW capacity, eliminates utility bill at this location.	Poor payback period. Full assessment of all solar ops has not been done so unknown if this is the best spot.	23,738	$ 0.166	$ 3,941
5	Fire Station 2 PV Solar Project	$ 90,000	$ -	$ 90,000	Fair energy savings. Design will be complete in 5/2009; adds 10 KW capacity, eliminates utility bill at this location.	Poor payback period. Full assessment of all solar ops has not been done so unknown if this is the best spot.	21,344	$ 0.166	$ 3,543

Table 9.1 Example of EECS project ranking process

The City Council has requested that a CAP funding strategy be developed that outlines mechanisms to fund the staff positions identified within the Plan as well as the programs needed to achieve success. Initial findings will be reported back to Council by the end of 2012 with periodic updates thereafter.

Tracking and Reporting of Success

Reporting on our cumulative success is a critical part of this CAP. Program implementation evaluation, cumulative GHG reductions, and updates of the GHG Emissions Inventory will be reported periodically (biannually if funding permits) to the community and to the State. The information will document the extent to which Santa Cruz has accomplished its own climate action goals and State GHG reduction mandates (AB 32, AB 375). It will be used to evaluate future actions and demonstrate how communities can make sound investments in conservation and sustainable alternatives while contributing to a vibrant local economy.

It will be the responsibility of the Sustainability Team and City Manager's Office (or his designee) to help integrate CAP objectives into these programs and ensure that the City meets both its program specific environmental objectives and its overarching sustainability and climate objectives. The Sustainability Team will quantify the cumulative success of City programs, identify additional action to address missed goals, and prioritize financial resources to meet the CAP objectives.

- Sustainability and Climate Action Coordinator ½ FTE
- Residential and Schools Climate Team Coordinator ½ FTE
- Green Business Sustainability Coordinator 1 FTE
- Efficiency and Renewable Energy Office Manager 1 FTE
- Sustainable Transportation Planner 1 FTE

CAP Tracking and Reporting	Responsible Parties	Periodicity
Municipal GHG Emission Inventories	Energy Management Office	2-5 years
Tracking and reporting the progress of the EECS	Energy Management Office	Annually
Community GHG Emissions Inventories	Climate Action Program	2-5 years
Increased energy efficiency of residential properties	Climate Action and Green Building	2-5 years
Increases in Green Building commercial properties and efficient commercial space	Green Business & City Green Building Program	5 years
Successful implementation of measures to meet the Transportation objectives	Transporation Team and Planner	Annually
Environmental Quality Index for Bicycle infrastructure	Transporation Coordinator and Climate Action	2 years
Water Conservation Efforts and District water use	Water Department	Annually
Waste Characterization Studies and Diversion Rates	Solid Wast and Recycling	2-5 years
Renewable energy investments within the EECS and City departments	Energy Management Office	Annually
Increase in Community Solar instalation projects	Energy Management Office & Climate Action	2 years
Sustainable projects by the City and the Climate Action Compact	Climate Action Program and Compact	Annually
Community participation, Green Business certification and City Sustainability	Climate Action and Green Buisness programs	2 years

Table 9.2 Reporting strategies for CAP implementation

CITY OF
SANTA CRUZ